SOPRONI EGYETEM | BENEDEK ELEK PEDAGÓGIAI KAR



László Varga – Arianna Kitzinger – Réka Kissné Zsámboki

Changing Perspectives and Attitudes on Early Childhood Research and Education

László Varga – Arianna Kitzinger – Réka Kissné Zsámboki

Changing Perspectives and Attitudes on Early Childhood Research and Education

Edited by Gábor Kovács

UNIVERSITY OF SOPRON PRESS
SOPRON, 2022

Publisher: Prof. Dr. Attila FÁBIÁN
the Rector of University of Sopron

Cover image: Pixabay.com (Victoria_Borodinova)
https://bit.ly/3Jys1cH

Authors:
Habil Dr. László VARGA PhD
University of Sopron
Institute of Educational Sciences and Psychology
Dean
varga.laszlo@uni-sopron.hu

Dr. Arianna KITZINGER PhD
University of Sopron
Humanities Research Centre
Head of the Centre
kitzinger.arianna@uni-sopron.hu

Réka KiSSNÉ Dr. Zsámboki PhD
University of Sopron
Institute of Educational Sciences and Psychology
Vice Dean for Science and International Relations
kissne.zsamboki.reka@uni-sopron.hu

ISBN (pdf) 978-963-334-425-5
DOI https://doi.org/10.35511/978-963-334-425-5

Hungarian Electronic Library:
https://mek.oszk.hu/22900/22927

Supported by EFOP-3.4.3-16-2016-00022 „QUALITAS”
Development of Higher Education in Sopron,
Szombathely and Tata

EFOP-3.4.3-16-2016-00022 „QUALITAS”
Minőségi felsőoktatás fejlesztés Sopronban,
Szombathelyen és Tatán

Table of Content

The authors 4

László VARGA:
ON THE BRIDGE BETWEEN PAEDIATRIC NEUROLOGY
AND EARLY CHILDHOOD PEDAGOGY 5

1. Neuropedagogy in early childhood in Hungary: Foundations and micro-investigation 5
    1.1. Learning objectives 5
    1.2. Neuropedagogy in early childhood education in Hungary 7
    1.3. An empirical micro investigation 9
    1.4. Closing remarks 11
2. Current trends, dilemmas and future directions in neuropedagogy in the field of early childhood 11
    2.1. Learning objectives 12
3. Trends, Topics and Issues Related to Early Childhood in Neuroeducation 13
4. Research in Neuroeducation 15
5. Closing remarks 17
6. Conclusion and acknowledgement 17

References 18

Arianna KITZINGER:
THE AGE OF LANGUAGE LEARNING IN MODERN EUROPE 21

Introduction 21

1. An international overview of languages and language learning 22
    1.1. The European map of languages 22
    1.2. Multilingualism vs. monolingualism 24
    1.3. Linguistic diversity 24
2. Bilingualism in education 26
    2.1. Language learning at school 27
    2.2. Early start of language learning: pros and cons 28
    2.3. The process of language acquisition 29
3. From theory to practice: how to implement a bilingual programme in the kindergarten? 32
    3.1. The kindergarten method 32
    3.2. The kindergarten programme 33
    3.3. Activities in the kindergarten 34
    3.4. Early English in action 35
4. Conclusion and acknowledgement 39

References 40

Réka KISSNÉ ZSÁMBOKI:
TEACHING MATHS AT EARLY YEARS – FROM LECTURE
METHOD TO DISCOVERY APPROACH 43

1. Activity based learning at early years 43
    1.1. Theories about learning 43
2. Early math skills 45
3. From cognition to conceptualization at early years 46
    3.1. Thinking and learning by doing 46
    3.2. Developmental stages of conceptualization 48
4. Numeracy and numerical innate abilities 50
5. Mathematical competences in early childhood 51
6. From lecture method to discovery approach 53
7. Conclusion 55

References 56

The authors

László Varga Habil. PhD
Dean, Associate Professor

University of Sopron, Benedek Elek Faculty of Pedagogy
9400 Sopron, Ferenczy János u. 5. Hungary
email: varga.laszlo@uni-sopron.hu

He is the founder and leader of the unique early childhood neuropedagogical research group and laboratory in Hungary. Together with prominent professionals, he has established an international research and counselling network. He is the member of international advisory groups of American and European educational scientific journals. In the frame of research and teaching scholarships he has represented Hungarian higher education and educational science all over the world. His main research fields are childhood's effect on personal life paths, children's worldview and children's culture, childhood progress and development, constructivist pedagogy, early childhood neuropedagogy and competence-based education. He was awarded with Apáczai Csere János Prize for his outstanding academic performance in promoting educational practice.

Arianna Kitzinger PhD
Head of Centre, Associate Professor

University of Sopron, Benedek Elek Faculty of Pedagogy
9400 Sopron, Ferenczy János u. 5. Hungary
email: kitzinger.arianna@uni-sopron.hu

She originally graduated as a teacher of Hungarian and English language and literature. She wrote her BA and MA theses on Finnish and American literary themes, then another MA thesis on the language policy of the EU. She got her PhD in Linguistics from Pázmány Péter Catholic University, Budapest, in 2015 with a dissertation on the challenges of multilingual and multicultural education. Her new research topic is the socio-linguistic effects of the political transition period in the post-communist states in the 1990s. At present she works as an associate professor at the Institute of Communication and Social Sciences at the University of Sopron, Hungary. In January 2020 she was appointed the head of the Human Sciences Research Centre (HSRC) at Benedek Elek Faculty of Pedagogy where she aims to focus on the internationalisation of research in teacher training.

Réka Kissné Zsámboki PhD
Vice Dean, Associate Professor

University of Sopron, Benedek Elek Faculty of Pedagogy
9400 Sopron, Ferenczy János u. 5. Hungary
email: kissne.zsamboki.reka@uni-sopron.hu

She originally graduated as a kindergarten teacher in 1994 and got a MA degree in Educational Sciences in 2012. She got her PhD in Educational Sciences from Eötvös Loránd University, Budapest, in 2013 with a dissertation on the evolvement of the Freinet-pedagogy in the Hungarian kindergartens. She has more than twenty years work experience in pre-primary education and in pre-primary teacher training. She is the author of some books on mathematics education in early childhood. At present she is the editor-in-chief of the Training and Practice international journal of educational sciences. She serves as a vice dean for international relations and science and works as an associate professor at the Institute of Educational Sciences & Psychology of the University of Sopron, Hungary.

https://doi.org/10.35511/978-963-334-425-5-Varga

László VARGA

ON THE BRIDGE BETWEEN PAEDIATRIC NEUROLOGY AND EARLY CHILDHOOD PEDAGOGY

„Brains are built, not born."
J., Shonkoff[1]

1. Neuropedagogy in early childhood in Hungary: Foundations and micro-investigation

Neuropedagogy is an emerging field of study in Hungary. This paper provides an overview on the professional directions and works in which The International Research Team and Laboratory of Neuropedagogy (NeuPedLab)[2] at the Sopron University, Benedek Elek Faculty of Pedagogy, in Sopron, Hungary is engaged. This material reports on the theoretical approaches of neuropedagogy in Hungarian early childhood education. In the context of international research, the article also reports on the findings of a pilot study on Hungarian early childhood teachers' understanding and willingness to use information about brain development in their everyday practice. The educational material concludes with highlights about the importance of infusing knowledge about the brain and pedagogy to maximize young children's development.



Figure 1. NeuPedLab
(https://www.facebook.com/neuropedagogia/)

1.1. Learning objectives

The concept of neuropedagogy is built on the theory of constructivism. Jean Piaget, the Swiss psychologist and the founding theorist of constructivism pointed out that knowledge which is a result of the child's reaction to the environment, is constructed through interaction with real objects in authentic situations. Overall, Piaget (1970) determined knowledge as the result of the brain activity in which the child constructs an understanding through interactions with his/her environment.

---

[1] Harvard University, Center on the Developing Child

[2] NeuPedLab International Research Team and Laboratory of Neuropedagogy; University of Sopron, Benedek Elek Faculty of Pedagogy, Ferenczy János u. 5., 9400 Sopron, Hungary
URL: http://bpk.uni-sopron.hu [2022.03.22.]
URL: https://www.facebook.com/neuropedagogia [2022.03.22.]



Figure 2. Jean Piaget
(https://www.biography.com/scientist/jean-piaget)

The perception of learning is constantly changing. Some people associate learning with the years in school; however, learning takes place throughout life. After acknowledging the importance of school-based learning, in adulthood we experience learning in other alternative ways such as learning outside the school, learning from home and cultures, acquiring knowledge in real life situations, and learning without direct teaching. The current findings of neuropedagogy support the importance of learning even before school-based learning, because young children develop their personalities, their approaches and relationship to the world around them during the early years of life. Therefore, it is vital to provide an environment for optimal development during the first eight years of life. Ultimately, learning is an essential but complex process in which we, human beings are engaged from birth to death.

Constructivism, a new paradigm of learning theories which emerged in the 20th century, focused on the child's inner world rather than on the process of learning. In Hungary, Nahalka István (2002) served as a key figure in research and application of constructivism in pedagogy. According to the constructivist learning theory, the child is unable to receive the knowledge as a passive participant but rather the child is an active participant in the construction of the new knowledge (McDevitt and Ormond, 2016). Therefore, the role of a child as an active learner generated a symbol of "self-made man". In addition, the child's brain, which plays an important role, is responsible for interpreting, and constructing new information. This way the child actively builds new information on his/her prior background knowledge expanding "the mental map" of the surrounding world in his/her brain. Furthermore, the learning process is driven and lead by the child who is constructing the new knowledge (self-made child); at the same time the teacher or caregiver take a supporting role. The knowledge is not delivered by the teacher, adult or caregiver, but rather the process of learning is facilitated by the teacher in an optimal environment to promote children's construction of new structures and concepts. This theory of learning emphasizes the role of teachers in exploring the child's prior or background knowledge and in creating a supportive learning environment (Bredekamp and Copple, 2015). Overall, the child is the main "actor" in this construction of knowledge and the teacher provides a pedagogically appropriate approach to facilitate this learning process. Montessori's motto expresses the role of the child and teacher in the constructivist learning process *"Support me so that I can do it on my own"*.



Figure 3. Maria Montessori
(https://www.montessorisubirats.com)

1.2. Neuropedagogy in early childhood education in Hungary

The International Research Team and Laboratory of Neuropedagogy (NeuPedLab) is a unique scientific institute at the Sopron University Benedek Elek Faculty of Pedagogy in Sopron, Hungary. Based on the Hungarian and international interdisciplinary scientific research in early childhood education, the institute aims to explore the avenues for applying the current results of neuroscience as they are applicable in the field of pedagogy. Members of this research team: pediatric neurologists, researchers of educational sciences, psychologists and classroom teachers, collaborate on studies in order to develop new pedagogical theories and educational innovations built on current knowledge in neurology, neuroscience and pedagogy.

Research studies on young children's brain development and emotional development indicate the critical importance of early years in child growth and development and the child's future life (Bergen and Woodin, 2017). When the research findings related to young children's brain and emotional development are integrated with essential issues of pedagogy, a scientific dialogue between classroom teachers and neurologists is expected to surface with the intention of exploring the possibilities for initiating new directions in pedagogy (Nouri, 2016). The human brain is a complex organ which is perceived as a challenging area both for scientist and teachers to better understand (Adam, 2012).

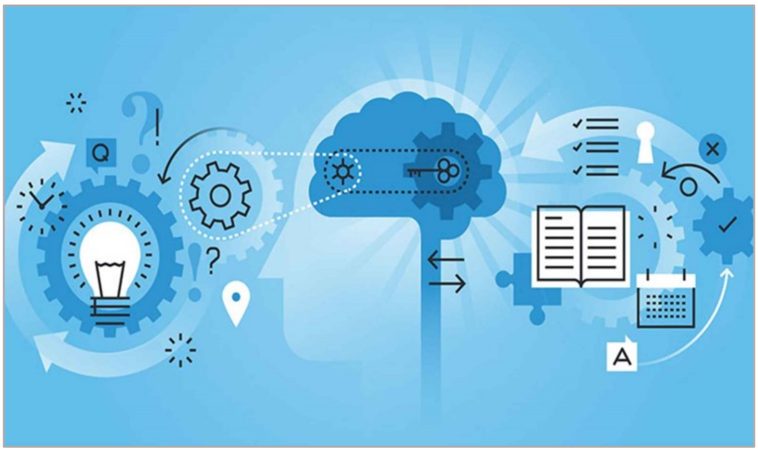


Figure 4. Neuroscience and Education
(https://edrsrch.io/neuroeducation-connecting-neuroscience-and-education/)

Neuropedagogy includes two vital and distinctive areas: (1) the impact of research in pediatric neurology for pedagogical practices, and (2) knowledge about learning (Howard-Jones, 2011). During the first eight years of life the brain develops with such enormous speed and depth that by the age of three the neural network is well-developed. Brain development during these first eight years allows children to learn about their environment. These years are a window of opportunity, a sensitive period for learning. Around the age of eight, this window of opportunity narrows and the sensitive period of learning closes (Bergen and Woodin, 2017). Research indicates the quality of child care has an impact on the development of the brain structure and neural network. Therefore, it is vital to determine the nature of experiences to which children are exposed during these vital years. If these positive and productive experiences are limited and/or children have no access to activities and experiences to explore their environment and their self, the inadequate neural network in their brain will hinder their exploration and learning (Farmer-Dougan and Alferink, 2013). Children's interest in understanding the world around them is the first and essential way of learning for young children. On the other hand, the constant stress, traumas, and physical and emotional neglect and abuse will result in learning difficulties and other cognitive and social impairments (Bergen and Woodin, 2017). In the field of neuropedagogy, pediatric neurologists examine the neurological development of children, while teachers utilize learning strategies that are conducive to young children's learning and the utilization of brain capacity. As Csíkszentmihályi (2010) notes effective investments in early childhood leads humans to a happy life. Therefore, early childhood educators have responsibilities and opportunities to positively impact the early years to later life.

Comprehensive questions and study activities

- What does the Theory of Constructivism mean and why is it important in early childhood education?
- What are the distinctive areas of neuropedagogy and what current research indicates early brain development?
- Find a minimum of 3 research articles detailing the impact of quality childcare and describe how the research you found supports the importance of positive experiences in early childhood education.

1.3. An empirical micro investigation

In an empirical study in neuropedagogy, we examined the ways of support that early childhood educators provide to young children to optimize brain development. (Borbas and Varga, 2017). Our theoretical framework included constructivism and research in neurology and pedagogy. This pilot study used a paper-pencil survey which was distributed in ten kindergartens. The 45 participants were between 35-46 years old with different lengths of teaching experience. In this study, we intended to explore the early childhood teachers' knowledge about brain development and their willingness to explore and use the recent findings of scientific studies in neuroscience. The results indicated that the majority of the teachers (75%) has basic knowledge about theories related to young children's neurological development. Most participants (86%) expressed interest, and willingness to expand their knowledge about the implications of neuro studies in the field of education. Even higher percentage of teachers (91%) believed that they would need more professional development in methods and approaches that are conducive to and aligned with brain development. The results of this pilot study indicated that studies in neuroscience are needed to improve of early childhood educators' professional skills and knowledge.

The results of our study also indicated the teachers' professional understanding of constructivism and its support for brain development. Unlike traditional school-based experiences, recent activities in kindergarten promote critical thinking, creativity, "aha moments" and constructive explorations which are supported with intentional pedagogy and planning. In addition, some traditional school models and curricula e.g., hurried delivery of information, lack of time for in-depth exploration, meaningless regulations, and focus on errors - hinder creativity, and innovative solutions for problems. In the traditional school model, students are rarely encouraged to find several alternative solutions, individual views and opinions are not welcome and arguments or different viewpoints are discouraged; overall individual views and opinions are expelled (Deli-Buda, 2007). On the other hand, developmentally appropriate education in kindergarten offers numerous and unlimited opportunities for exploration allowing trial and error approach in an environment in which children's interest and motivation is carefully nurtured (Bredekamp and Copple, 2015). For children's uninterrupted development, it would be essential to have a transition between kindergarten and school which would demonstrate the characteristics of support for learning present in the kindergarten.



Figure 5. Learning in the Kindergarten

(https://www.greysprings.com/products/preschoolbasics)

The quantitative analysis of the data indicated that the kindergarten teachers have basic knowledge about the brain's development and its neurological consequences. The participants expressed a positive attitude about the enhancement of their knowledge related to brain

development. Overall, the responses suggested that the teachers are willing to increase their pedagogical knowledge, and expressed interest in applying this new knowledge in their practice. This interest in professional development is promising; teachers who are aware of the need to expand his/her knowledge about the brain are more likely to effectively meet the challenges of the paradigm change which includes the infusion of cognitive sciences and pedagogy.

The results also indicated that the most recent research findings in neuroscience have had an impact on teachers' pedagogical practices. Overall, the results indicated a dominance of constructivism in the participants teaching philosophy regarding learning, and ultimately a neuro-constructivist approach in kindergarten pedagogy was present. In particular, the support for the children's developing neurological system is the most optimal when the following criteria are present: consideration of children's interest and prior knowledge, a supportive environment and the guidance both at social and cognitive levels.

The results of the pilot study also suggested the importance of the infusion of the neuro-constructivist approaches and the teachers' practical methodological approaches. This infusion ultimately leads the teachers to create and maintain a project-based kindergarten model with activity- and experience-based curriculum. In addition, the environment is instilled with love, attention, emotional support, and empathy during the learning process. In this model, the children's emerging and developing competencies are supported and guided with intentionally designed activities and experiences. The play-learning-work triad dominates in the daily activities which offers authentic environment for optimal brain development. Children's emotional well-being is supported with positive experiences through puppetry, music, drama and art activities as well as through free play; all of these become a contributor to optimal brain development. All these results suggests Selma Fraiberg's though *"Early years are years for miracles"* (Fraiberg, 2014).

Prior to this Hungarian micro-investigation, Zambo, (2008); Zambo & Zambo, (2012) conducted studies about in-service teachers' and teacher candidates' knowledge, thoughts and views about neuroscience and education. In these studies, more than 850 teacher candidates and classroom teachers participated. The findings suggested that most teachers and teacher candidates are interested in neuroscience and use resources to expand their knowledge. They indicated the need for incorporating information about neuroscience in teacher preparation programs because they believed that this information would better prepare them to more effectively work with children, especially, children with special needs. Specifically, those teachers who expressed full support for the inclusion of neuroscience in educational practices perceived neuroscience as the most current and evidence-based information for teachers to diagnose children with learning difficulties and utilize differentiated instruction for diverse learning styles. On the other hand, teachers who had reservation about neuroscience acknowledged the benefits of neuroscience; however, they also pointed out the limited nature of neuroscience and requested more information in psychology and child development to gain a holistic understanding of development and learning. In addition, a small number of teachers were hesitant to consider the findings of neuroscience research because of the lack of the quality of research and they emphasized the need for carefully controlled studies about classroom practices. As Zambo & Zambo (2011) found that these so called non-believers perceived children as much more than what a brain scan can capture, and stressed the variety of other characteristics and impacts that young children hold and experience.

The need for effective teacher preparation in terms of teachers' competencies for interpreting the findings of neuroscience research is well documented by Zambo, Zambo & Sidlik (2013). In their study, they found that teachers are easily misled, because they find information accompanied with fMRI images more credible than information presented with a graph or no image. Zambo, Zambo & Sidlik (2013) warns about the neuromyths which are

“widely used” teaching and learning ideas and concepts with no scientific evidence. Overall, this line of research substantiates the findings of the micro-investigation with Hungarian teachers which also found that teachers were knowledgeable about the use of neuroscience research findings in education to some extent; and they were willing to increase their knowledge. In the future, the Hungarian micro investigation can be expanded, for example with higher number of teachers and a more targeted teacher population, to gain further insights into teachers’ views about neuroscience and its impact on teachers’ classroom practices.

Comprehensive questions and study activities

- Why is it important to improve the knowledge of early childhood educators in neuroscience?
- List at least 5 positive things that children will experience during Kindergarten.
- Keeping those 5 positive experiences in mind, please provide 5 complimentary strategies as to how one might facilitate a more manageable transition from the current Kindergarten exploratory experience to a more structured academic model in elementary school.

1.4. Closing remarks

In Hungary, a new image of children, a new perspective on childhood and a new educational-pedagogical approach to young children are emerging. Research about different areas of child development has changed and molded our understanding of childhood and our approach to education. One of the main areas that produced significant changes is the scientific researchabout brain development and the brain structure. The results of these international studies suggest the need for a paradigm change, a change in perspectives in terms of young children development and education.

It is time to reconsider the pedagogical landscape of Hungary, especially in early childhood education, including the content of early education, and the role and responsibilities of pedagogical programs and curriculum. For these changes, the result of neuroscience, pediatric neurology should serve as an important foundation and promote pedagogy that is built on knowledge about the brain.

2. Current trends, dilemmas and future directions in neuropedagogy in the field of early childhood

During the past 25 years, research on brain structure and function has expanded our understanding of the relationship between brain development and learning. This field of study is referred to with several terms such as neuroeducation, neuropedagogy, and Mind, Brain and Education. Although a strong interest in neuroeducation is present among researchers and teachers, often misleading recommendations from neuroscience research are made for classrooms. This article provides an overview of neuroeducational research studies in early childhood education to demonstrate how this field of study impacts teachers’ and parents’ understanding of best practices and optimal development. Also, to address the concern of the valid and reliable research in neuroeducation, we outline the principles of neuroeducational research based on Nouri (2016), and propose directions for future research.

2.1. Learning objectives

During the past 25 years research on brain structure and function has expanded our understanding of the relationship between brain development and learning. Educators, parents and scientists recognized the importance of this knowledge for supporting children's optimal development. This new paradigm of learning has been referred with different terms. For example Nouri (2016) uses the term of *neuroeducational studies* which is "defined as a growing interdisciplinary field based on synergetic connection between neuroscience, cognitive science, psychology, and education in an effort to improve our theoretical and practical understanding of learning and education" (p.59). Other theorists call this field of studies as, for example, *educational neuroscience*, *neuroeducation* (Smeyers, 2016), *Mind and Brain and Education* (Howard-Jones, 2011) *neuropedagogy* and *neurodidactics* (Kraft, 2012). Similar to Nouri's definition Patten and Campbell (2011) delineates *educational neuroscience* as a field of study that "produce{s} results that ultimately improve teaching and learning, in theory and practice" (p. 6). Though different names are used synonymously for the disciple; all seem to convey the idea that instead of being a single discipline, it is an interdisciplinary field that aims to explore a holistic understanding of learning and education.

Nouri (2016) firmly separates neuroeducational studies from the so called "brain-based learning" due to the recent criticism about brain-based learning for its overgeneralizing and oversimplifying neuroscientific findings for the use of education. Zambo (2013) also expressed her concern about misusing ideas related to neuroscience and applying neuromyths, as she refers to these simplified and misinterpreted ideas of neurological studies in education. Similarly, Howard-Jones (2010) warns about neuromyths that play a significant role in molding teachers' views and understanding of the relationship between brain and education. These neuromyths often misguide teachers; for example when teachers advocate for so called hemisphere strategies to remedy learning disabilities based on the notion that people are rather right or left-brained, though none of these "myths" are substantiated with data in the field of neuroscience. To eliminate the problem of oversimplification, overgeneralization and misuse of information in neuroscience, researchers calls for merging several disciplines such as cognitive psychology, neurosciences, psychology, cultural anthropology and education, so that with a multidisciplinary approach, neuroscientists can assist teachers in better understanding the brain structures and functions (Hruby and Goswami, 2011).

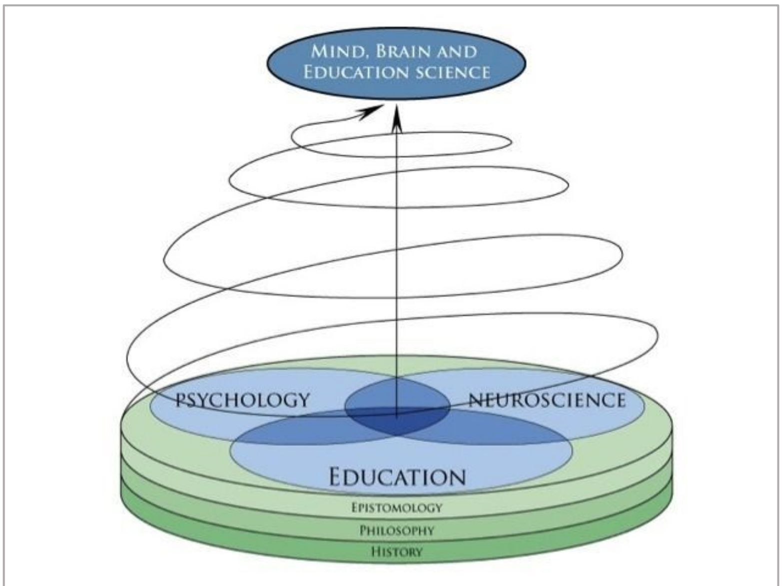


Figure 6. Neuroeducational studies
(https://hu.pinterest.com/pin/154107618470178730)

In this paper, we will provide an overview of neuroeducational research studies in early childhood education to demonstrate how this field of study impacts teachers' and parents' understanding of best practices and optimal development. In addition, to address the concern of obtaining and using the valid and reliable research in neuroeducation, we also outline of principles of neuroeducational research based on Nouri (2016), and propose directions for future research.

3. Trends, Topics and Issues Related to Early Childhood in Neuroeducation

The expectations and pedagogical practices in early childhood are rapidly changing to respond to the changing societies worldwide. Although with the help of technology, specifically with brain imaging, we understand more about child development; in many countries the over-emphasis on academic skills such as reading and math skills, and the neglect of social emotional development seem to trigger pedagogical practices that are developmentally inappropriate for young children, and hinder the implementation of balanced approaches to child development (National Association for the Education of Young Children, 2015). Tobin (2013) warns about the disappearance of play and appropriate physical movement in young children's every day activities as a result of the restricted learning outcomes and inadequate teaching methods with which teachers erroneously prioritize academic skills and disregard children's physical and social emotional needs. To ensure that young children are engaged in developmentally appropriate activities and interaction, Haslip and Gullo (2018) urge the support for conducting research and distributing the findings to educators, parents, and policy makers. This need for research-based practices in early childhood classrooms is targeted in the field of neuroeducation which uses the theories and techniques of neurosciences to inform pedagogical practices and further educational research. Without the intention to provide a comprehensive overview of topics in which neuroeducational research offered pedagogical implications for early childhood educations, we include intentionally selected topics of research that targeted essential skills and activities for young children.

Self-regulation, which children develop during the first five years, is a fundamental skill for life-long learning. Self-regulation includes skills to maintain attention, to be resistant to distractions and to avoid conflicting behavior. Early childhood teachers have a main role in helping children regulate their behaviors, emotions and reactions (Blair and Raver, 2015). Based on the research studies addressing the neurological processes for this effect of music implementing music, rhythm and movement to promote self-regulation is proposed (Williams, 2015). Although the impact of formal music training on neurological development is well-known (George and Coch, 2011), Williams (2015) argues that the infusion of coordinated rhythmic activities could serve as effective pedagogical approaches to address the neurological foundations of self-regulation. Similarly, Neville et al. (2008) found that children who participated in regular music training demonstrated higher level of auditory selective attention. Thus, research findings regarding the neurological base for improved self-regulation can guide teachers in applying music, movement and rhythm in the everyday classroom activities.

Social competence and mental health are vital emerging capacity during the early years; therefore, there is increased interest in research related to the neurobiological base of these skills. Neuroscience can identify leverage points for advancing brain development. In particular, parents' and caregivers' presence, and the frequency and quality of interaction with young child have an impact on the neurodevelopment of the brain, and ultimately influence the child's emotional regulations and social cognition (Szalavitz & Perry, 2011). Therefore, the parents' and educators' responsive interaction with children can facilitate the social emotional well-being of children.



Figure 7. Well-being of children
(http://www.oecd.org/social/family/child-well-being)

Neuroscience offers insights into children's neurological activities during reading or other literacy-related activities. For example, with examining preschoolers' brain wave length, Tan and Molfese (2009) found that children can discriminate between words of different syntactic classes, though not at the same level as adults. Caffara et al (2018) used MEG data about young children's (4-8 years old) reaction to written, and spoken words and visual objects. They found that the process of learning to read not only impacts written word processing but also affects object recognition: "suggesting a non-language specific impact of reading on children's neural mechanism" (p. 21). In addition, Hirsch (2013) points out that emotions are critical in cognitive development, more specifically in literacy development. Ultimately, with healthy emotions, as important building blocks in brain, children are more probable to succeed in literacy-related activities. These findings highlight the interconnection and interdependency between social emotional development and advancement in literacy skills, which teachers should consider when planning literacy activities.

The benefits of play is well-documented in general; though some studies specifically point out the neurological advantages of play during childhood. For example, pretend play promotes brain development through emotions and cognition in executive function; and stimulates synaptic connections (Szalavitz and Perry, 2011). In addition, Fletcher (2011) argues that play settings are the optimal environment for children to develop self-regulations, to exhibit pro-social behavior and to learn to control aggression. Furthermore, Burdette and Whitaker (2005) highlights the positive effect of free play with physical activities that involves gross motor play; children develop vital executive function skills such as attention as well as social skills that ultimately enrich emotional and cognitive development.

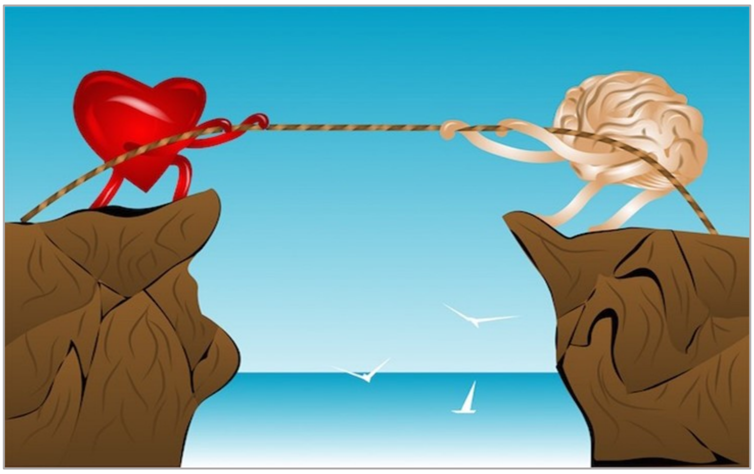


Figure 8. Emotional and/or cognitive?
(https://eletmod50.com/az-on-szive-erzekeli-az-erzelmi-allapotot)

Overall, these examples for neuroeducational research related to young children's self-regulation, social competence, literacy skills and play clearly demonstrate the holistic and interdisciplinary nature of investigations of these issues related to child development. Further, in order to offer evidence-based implications for early childhood classrooms and to eliminate neuromyths which misguide teachers and parents, design and conduct quality research in in neuroeducation is imperative.

Comprehensive questions and study activities:

- Please provide 5 technique to support the development of emotional self-regulation skills in the preschool classroom.
- Please describe the way and which music can promote emotional self-regulation by offering specific examples of musical activities that can be used in a preschool setting?
- What is the benefit of play? How can play support a child's overall well-being? Please offer 3-5 examples of what the benefit of play is and how it can support a child's overall wellbeing.

4. Research in Neuroeducation

Research in neuroeducation, which is conceptualized as an area within education, is needed in order to provide brain-related evidence-based suggestions and implication for educators. Nouri & Mehrmohammadi (2012) defined the boundaries and nature of neuroeducation and also outlined the principles of neuroeducation research. Specifically, Nouri (2016) identified five principles for scientific inquiry in neuroeducation based on which the conclusions and implications drawn from the research findings can offer relevant, evidence-based and usable outcomes. First, neuroeducation is interdisciplinary in nature because researchers incorporate the knowledge from diverse fields which include psychological, neural and pedagogical foundations of learning and development. Because of this interdisciplinary approach to a problem to investigate, there is an increased chance to propose solutions to educational issues from the perspectives of neuroscience and other disciplines (Schwartz & Gerlach, 2011). To the present, few studies have been conducted with a collaboration of researchers in the field of neuroscience, and pedagogy (Nouri, 2016). The second principle of neuroeducational research describes it as *applied* research which

ultimately produces findings that improve educational practices. Ultimately, educators and scientists are encouraged to collaborate and identify and examine questions that will advance educational practices (Nouri, 2016). Neuroeducational research has the potential to offer valid and reliable findings with an application for classrooms. Third, neuroeducational research can use a variety of methodological designs; thus both qualitative and quantitative methods could offer a new level of understanding related to learning and development. The fourth principle is an expectations regarding the researchers' ability to adjust neuroeducational research and their own philosophical standpoint. Specifically, a researcher with a certain philosophical orientation determines what questions and issues to investigate (Hendricks, 2017). The final principle is that neuroeducation is value-saturated because of the ethical and moral issues involved (Nouri, 2016). In addition to the evaluation of the impact of research findings, it is essential to consider the ethical issues in the application of neuroscience research in education. Furthermore, Zochi and Pollack (2013) emphasizes the importance of *neuroethics* as a new field which responds to the ethical issues in the context of cultural and social structures. Based on these five principles of neuroeducational research, Nouri (2016) argues for a common definition for neuroeducational research which incorporates these principles:

"Neuroeducational research is an interdisciplinary endeavor to develop an insightful understanding and holistic picture of problems related to learning and education. It thus epistemologically is based on an integrated methodological pluralism paradigm. This requires researchers to understand multiple methods and methodologies and employ as they formulate their own research projects. Researchers have a critical role to play in providing systematic evidence and conclusions that are scientifically valid and reliable and educationally relevant and usable." (p. 64)

Regarding the future directions in neuroeducational research Nouri (2016) suggests the implementation of the four stage approach proposed first by Pincham et al., (2014). First, educators and researchers in collaboration identify educational areas in need for which neuroscience might find solutions. At stage two and three neuroscience researchers design and conduct an investigation of a problem in a laboratory and analyze whether the findings can be employed in an educational setting. At the final stage, teachers and researchers in collaboration reflect on the research findings from the perspective of their discipline. Overall, it is essential to maintain a collaborative relationship between educators and neuroscience researchers to carry out neuroeducational research which advances the pedagogical practices and positively impacts students' learning.

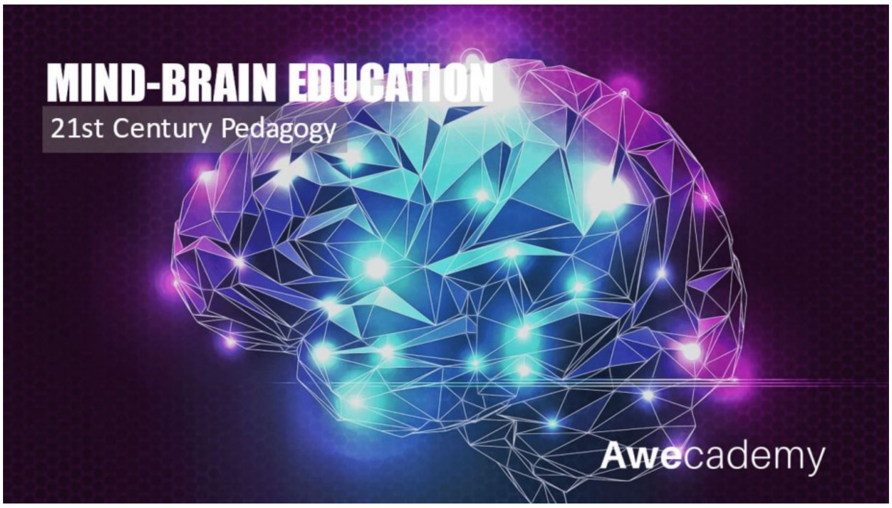


Figure 9. Neuroeducation research
(https://www.learn.awecademy.org)

Comprehensive questions and study activities

- What is Nouri's five principles of scientific inquiry?
- What is the definition of neuroeducational research and why is it important to have a common consensus regarding this topic?
- Please explain the significance of the collaborative relationship between educators and neuroscience researchers? How does this collaboration manifest in the context of classroom practices in curriculum implementation? (Please provide 3-5 examples)

5. Closing remarks

Neuroscience and neuroeducation/neuropedagogy is attractive. Researchers and teachers want to understand brain functions and brain structures so that they can facilitate learning. Especially, early childhood educators and parents are open to and interested in the newest findings of neuroscience so that they can better facilitate child's behavior, motivation and attention for future success. Although there is a need for further research-based guidance in education, caution must be taken. Neuromyths that are misconception about the mind and brain functioning could cover and hide real relationship between brain and education, and might cause unwanted side-effects in education. Because of the wide-spread misconceptions about brain and the applicable recommendations, further research is needed. As Pasquinelly (2012) put"knowledge must be pursued, conveniently disseminated, and taught (p. 93). With this emerging new knowledge, early childhood teachers will be better equipped to implement a developmentally appropriate curriculum.

6. Conclusion and acknowledgement

Interpretation and understanding the first years of human life, early childhood and childhood have undergone paradigmatic changes in the last few years. The latest national and international researches emphasize childhood as a key factor in the course of life of the individual. Developing and educating children is crucial for the progress of a nation and the development of the economy, since only happy, well-balanced, talented children are able to build a prospering and sustainable society. In case the investment in children and families happens in a bright way, the next generation will surely pay it back. Looking at our children from a wide perspective we can say that they are the citizens, workers, parents of tomorrow, the founders of the society of the future and the basis of the development of the economy. Intelligent investment is a kind of key in establishing a happy life, so there is an unlimited chance and extreme responsibility on our shoulders, since early years last forever. It is therefore vitally important that student teachers have very high quality initial teacher education, supported by well-educated and knowledgeable lecturers and pedagogues. It is also important that qualified teachers and other adults working with our youngest children have access to, and opportunities for continual professional development throughout their career. Having highly qualified teachers for young children is vital as the early years are such an important stage of children's development and pave the way for all future learning.

The period up to eight years is considered to be the peak time for brain development. From birth to about the age of eight the brain is a super-sponge. This is the brain's most absorbent stage, where it actively learns from its environment. "Windows of opportunity" are sensitive periods in children's lives when specific types of learning take place. Information flows easily into the brain through 'windows' that are open for only a short duration. Then the 'windows'

close, and much of the fundamental architecture of the brain is completed. Scientists are continually learning more about how young children's brains develop. At the same time, teachers are looking for effective strategies to help children use their brains to their fullest capacity.

This educational material contributes to this dialogue by summarizing what we already know about the learning process in the brain and suggests how it might inform the teaching and learning process in the classroom.

I would like to express my very special thanks to my colleagues, Tünde Szécsi, Veronika Mák, Réka Kissné Zsámboki and Suzy Rosemond for their excellent work and professional assistance during the project. My sincere and heartfelt thanks also go to the participants of this international research.

REFERENCES

Ádám, Gy. (2004). *A rejtőzködő elme.* Budapest: Vince Kiadó.

Bergen, D. – Woodin, M. (2017). *Brain research and childhood education. Implications for educators, parents and society.* New York: Routledge.
DOI: https://doi.org/10.4324/9781315465173

Blair, C. – Raver, C. (2015). School readiness and self-regulation: A developmental psychobiological approach. *Developmental Psychology, 66,* 711-731.
URL: https://doi.org/10.1146/annurev-psych-010814-015221 [2022.03.22.]

Borbás, M. L. (2017). *Kisgyermekkori neuropedagógia. A kisgyermekkori agyfejlődés megtámogatása az óvodai nevelésben*. Sopron: SOE BPK, Kézirat.

Bredekamp, S. – Copple, C. (2015). *Developmentally appropriate practice (DAP) in early childhood programs. (6th edition)* Washington, D. C: National Association for the Education of Young Children (NAEYC).

Burdette, H. – Whitaker, R. (2005). Resurrecting free play in young children: Looking beyond fitness and fatness to attention, affiliation and affect. *Archives of Pediatric and Adolescent Medicine, 159*, 46-50.
DOI: https://doi.org/10.1001/archpedi.159.1.46

Caffara, S. – Martin, C. – Lizarazu, M. – Lallier, M. – Zarrage A. – Molinari, N. – Carreiras, M. (2017). Word and object recognition during reading acquisition: MEG evidence. *Developmental Cognitive Neuroscience. 24.* 21-32.
DOI: https://doi.org/10.1016/j.dcn.2017.01.002

Csíkszentmihályi, M. (2010). *Flow – Az áramlat – A tökéletes élmény pszichológiája*. Budapest: Akadémiai Kiadó.

Deli, É. – Buda, M. (2007). *Tanulástanítás? Élvezetes tanulás*. Budapest: Dinasztia Tankönyvkiadó.

Farmer-Dougan, V. – Alferink, L. (2013*). Brain development, early childhood and brain-based education: A critical analysis.* In Weassreman, L. – Zambo, D. (Eds.) *Early childhood and neuroscience - links to dedvelopment and learning.* New York: Springer.
DOI: https://doi.org/10.1007/978-94-007-6671-6_5

Fletcher, K. (2011). *Neuropsychology of early childhood*. In A.D. Davis (Ed.), *Handbook of pediatric neuropsychology* (pp. 31-36). New York: Springer.

Fraiberg, S. (2014). *Varázsos évek. Hogyan értsük meg és miként kezeljük a korai gyerekkor problémáit.* Budapest: Park Könyvkiadó.

George, E. – Coch, D. (2011). Music training and working memory: An ERP study. *Neuropsychology, 49(5).* 1083-1094.
DOI: https://doi.org/10.1016/j.neuropsychologia.2011.02.001

Haslip, M. – Gullo, D. (2018). The changing landscape of early childhood education: implications for policy and practice. *Early Childhood Education Journal, 46.* 249-264. DOI: https://doi.org/10.1007/s10643-017-0865-7

Hendricks, C. C. (2017). *Improving schools through action research: A reflective practice approach. (4th ed).* New York: Pearson.

Howard-Jones, P. A. (2010). *Introducing neuroscience research: Neuroscience, education and the brain.* New York: Routledge. DOI: https://doi.org/10.4324/9780203867303

Howard-Jones, P. A. (2011). A multiperspective approach to neuroeducational research. E*ducational Philosophy and Theory, 43(1*), 24-30. DOI: https://doi.org/10.1111/j.1469-5812.2010.00703.x

Howard-Jones, P. A. (2011). From brain scan to lesson plan. *Psychologist,* 24(2). 110-113.

Hruby, G. G. – Goswani, U. (2011). Neuroscience and reading: A review for reading education researchers. *Reading Research Quarterly, 46*(2) 156-172. DOI: https://doi.org/10.1598/RRQ.46.2.4

Kraft, V. (2012) Neuroscience and education: Blind spots in a strange relationship. *Journal of Philosophy of Education 46(3*). 386-396. DOI: https://doi.org/10.1111/j.1467-9752.2012.00868.x

McDevitt, T. – Ormrod, J. (2016). *Child development and education (*6rd Ed.), New York: Prentice-Hall.

Nahalka, I. (2002). *Hogyan alakul ki a tudás a gyermekekben? Konstruktivizmus és pedagógia*. Budapest: Nemzeti Tankönyvkiadó.

National Association for the Education of Young Children (2015*). Developmentally appropriate practice and the common core state standards: Framing the issues*. Washington, DC.: National Association for Education of Young Children.

Neville, H. – Andersson, A. – Bagdade, O. – Bell, T. – Currin, J. (2008). *Effects of music training on brain and cognitive development in underprivileged 3 to5-year-old children: Preliminary results.* Learning, arts, and the brain: The Dana Consortium Report on Arts and Cognition, the Dana Foundation. (pp. 105-106). New York. :

Nouri, A. – Mehrmohammadi, M. (2012). Defining the boundaries for neuroeducation as a field of study. *Educational Research Journal, 27(1).* 1-25.

Nouri, A. (2016). The basic principles of research in neuroeducational studies. *International Journal of Cognitive Research in Science, Engineering and Education. 4(1*), 59-66. URL URL: https://ijcrsee.com/index.php/ijcrsee/article/view/125/476 [2022.03.22.] DOI: https://doi.org/10.5937/IJCRSEE1601059N

Patten, K. E. – Campbell, S. R. (eds.) (2011). Educational neuroscience. *Educational Philosophy and Theory, 43(1*). 1-6.Pasquinelli, E. (2012) Neuromyths: Why do they exist and persist. *Mind, Brain and Education, 6.* 89-96. DOI: https://doi.org/10.1002/9781444345827

Piaget, J. (1970). *Válogatott tanulmányok*. Budapest: Gondolat Kiadó.

Schwartz, M. – Gerlach, J. (2011). The birth of a field and rebirth of laboratory school. *Educational Philosophy and Theory, 43(1),* 67-74. DOI: https://doi.org/10.1111/j.1469-5812.2010.00709.x

Smeyers, P. (2016). Neurophilia: Guiding Educational Research and the Educational field? *Journal of Philosophy of Education, 50(1),* 62-75. DOI: https://doi.org/10.1111/1467-9752.12173

Szalavitz, M. – Perry, B. (2011). *Born to love*. New York: Harper Collins Publishers.

Tan, A. – Molfese, D. (2009). ERP correlates of noun and verb processing in preschool-age children. Biological Psychology, 80(1), 46-51. N DOI: https://doi.org/10.1016/j.biopsycho.2008.04.014

Tobin, J. (2013). *The disappearance of the body in early childhood education*. In. L. Bresler (Ed.), *Knowing bodies, moving minds: Towards embodied teaching and learning* (pp. 111-126). New York, NY: Springer.
DOI: https://doi.org/10.1007/978-1-4020-2023-0_8
Williams, K. E. (2018). Moving to the beat: Using music, rhythm, and movement to enhance self-regulations in early childhood classrooms. *International Journal of Early Childhood, 50(1)* 85-100.
DOI: https://doi.org/10.1007/s13158-018-0215-y
Zambo, D. (2008). Childcare workers' knowledge about brain and developmentally appropriate practice. *Early Childhood Education Journal. 35*, 571-577.
DOI: https://doi.org/10.1007/s10643-007-0223-2
Zambo, D. – Zambo, R. (2011). Teachers' beliefs about neuroscience and education. *Teaching Educational Psychology, 7(2).* 25-41.
Zambo, D. – Zambo, R. (2012) Beliefs of college students inside and outside education. *Education Quest, 9(1).* 87-93.
Zambo, D. – Zambo, R. – Sidlik, L. (2013). Preservice teachers' perception of neuroscience, medicine and students with ADHD. *Journal of Excellence in College Teaching, 24(3).* 51-67.
Zambo, D. (2013*). The practical and ethical concerns of using neuroscience to teach young children and help them self-regulate*. In Wassreerman, L. H. – Zambo, D. (Eds). *Early childhood and neuroscience- links to development and learning. (*pp. 7-22). New York: Springer
DOI: https://doi.org/10.1007/978-94-007-6671-6_2
Zocchi, M. – Pollack, C. (2013). Educational neuroethics: A contribution from empirical research. *Mind, Brain, and Education, 7(1),* 56-62.
DOI: https://doi.org/10.1111/mbe.12008

https://doi.org/10.35511/978-963-334-425-5-Kitzinger

Arianna KITZINGER

THE AGE OF LANGUAGE LEARNING IN MODERN EUROPE

"All the world's a stage,
And all the men and women merely players;
They have their exits and their entrances,
And one man in his time plays many parts,
His acts being seven ages."[3]

Introduction

According to the famous monologue by Shakespeare, there are seven parts of **human life** where men play their parts as 1. infants, 2. school children, 3. lovers, 4. soldiers, 5. judges, 6. pantaloons[4] and 7. old men (Figure 1). Age may be a crucial point in several fields of life, among others in language learning, too. At least language learners usually attribute great importance to this when they start to learn a foreign language. Although personal age can be divided into several phases, in language pedagogy the distinction between *young age* and *old age* are generally opposed to each other. Here especially early childhood language development will be scrutinised with some hints to language learning in adulthood.



Figure 1. The seven ages on a stained window in the State Library of New South Wales
(State, 2021)

From another point of view, **historical periods** are often taken into consideration when the question of age turns up. It means the historical and social era we live in and which can change so considerably during human lifespan. If we use this approach while examining age, we will soon realise how much the society we live in makes an impact on our lives, for instance on education as well. In education we must never forget about the age we are living in; with its developments and challenges.

In this context our textbook in **three major chapters** deals with the timely questions of our age; whether it is scrutinised from personal or historical aspects. We will discuss the topic of language learning from a bird's-eye view where we start our journey in our present age in our linguistically diverse Europe (Chapter 1) from where the next station will lead us to the language education in our modern age (Chapter 2). The last part (Chapter 3) will provide students with the practical part of early childhood language development introducing a running bilingual programme in a kindergarten. A short description of the three chapters will be given at the beginning of the three major parts under the heading 'Learning objectives', while at the end of each major unit we, together with a few comprehensive questions, will intend to ask several food-for-thought questions for further inspiring dialogues in the classroom.

[3] Shakespeare: *As You Like It*, Act II Scene VII
[4] foolish old man (from Italian)

1. An international overview of languages and language learning

Learning objectives

Europe is the home of many nations, many countries and many languages. Most of these languages form a group of language families which means that these languages have similar roots and their structure and vocabulary are closer to each other than to other languages. With the help of two maps these families and their sub-categories will be introduced. Throughout the chapter the difference between the languages of Europe and those of the European Union will be described. The question of monolingualism and multilingualism are often manifested in political landscapes, so it is important to get familiarised with a few examples of language policy of some overseas countries and the basic standpoint of the European Union regarding linguistic diversity. By the end of the chapter, students will have a clear idea about European language families where they will definitely find their own language and the language(s) they are learning, they will be able to see the difference between monolingual and multilingual language policies and will probably form their own idea about linguistic diversity in their country, their continent and in their life.

1.1. The European map of languages

According to the classical division there are **four basic language families in Europe**: **Indo-European, Finno-Ugric** or **Uralic, Turkic** or **Altaic** and **Basque** (Figure 2).

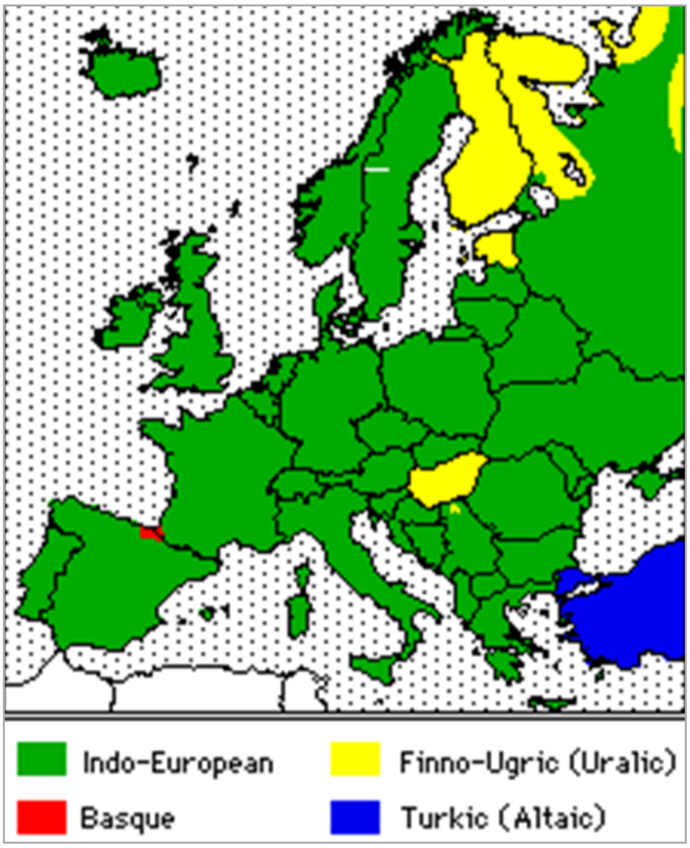


Figure 2. Language families in Europe
(My English, 2021)

Turkic or Altaic languages will not belong to the official languages of the European Union until the accession of Turkey. Turkish, however, does play a role in the EU in an indirect way if we are to reckon in the large number of Turkish immigrants in Germany and Austria, for instance. Neither is Basque an official language in the EU. Yet, its cultural and historical importance is unquestionable as it is considered to be among the most ancient surviving languages on the continent. Also, it is as unrelated to other languages as Hungarian is, even if the latter is categorised as a Finno-Ugric language. From among Finno-Ugric languages, Finnish, Estonian and Hungarian have become official EU-languages. But other Finno-Ugric languages are used as minority languages in the area of the ex-Soviet Union, and one of them, also as a minority language, in Finland, namely Saami or Lapp.

Undoubtedly **the most extensive language family** of the European continent is the **Indo-European** (Figure 3), which can be further broken down into **Germanic, Romance, Slavic, Celtic, Baltic, Greek and Albanian** sub-families. Related languages share similar grammar and vocabulary systems, but they are not automatically intelligible for their speakers.

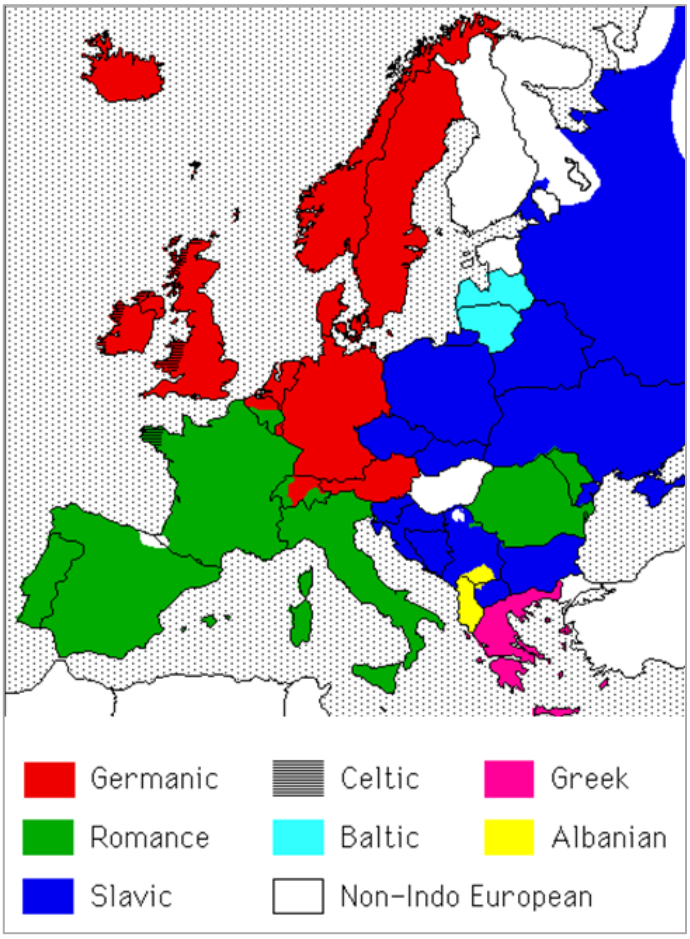


Figure 3. Indo-European sub-families in Europe
(My English, 2021)

Five EU official languages (as the descendants of Latin) belong to the Romance family: French, Spanish, Italian, Portuguese and Romanian. The Germanic family in the EU is represented by English, German, Danish, Dutch and Swedish. A number of Slavic languages, such as Polish, Czech, Slovak and Slovene, gained official EU-language status with the enlargement in 2004, and then Bulgarian in 2007. The same happened with the Baltic languages (Latvian and Lithuanian) in 2004. Greek has been an official language since 1981, while Albanian does not have any such a status.

The 24 official EU languages of the 27 member states in alphabetical order are Bulgarian, Croatian, Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Irish, Italian, Latvian, Lithuanian, Maltese, Polish, Portuguese, Romanian, Slovak, Slovenian, Spanish, and Swedish.

1.2 Multilingualism vs. monolingualism

If according to the basic tenet of the European Union every citizen of the Union is entitled to use their own mother tongue as a manifestation of democracy, then multiculturalism through multilingualism is to be welcomed. The European Union is not the only community in the world by far where different languages and different cultures live together. In fact, multilingualism is a more natural phenomenon than monolingualism all over the globe. In terms of language policy, two countries on the other side of the Atlantic will be examined here.

The United States has always promoted monolingualism. In its famous "melting pot" role, the USA has demanded that newcomers speak English. The established powers preferred "to found a New Eden rather than a New Babel" (Baron, n.d., para 4) and thus sought to compel its immigrant to acknowledge the rules and regulations of their new state. A proposed English Language Amendment[5] was voted down in 1981, and the United States still does not have an official language. English is, however, considered to be the *de facto* national language.

In spite of maintenance programmes, where immigrant children's mother tongue is aimed to be developed, education is more characterised by transitional bilingualism, where mother tongue is gradually substituted with English (Wolff, 1998).

In the northern neighbour of the United States, **Canada**, the picture is more refined. From a linguistic point of view Canada must be divided into Québec, which is an autonomous region where French is the only official language and the rest of Canada where multilingualism is supported. The latter statement is especially relevant for Ontario, where a great number of language immersion programmes are available for children to acquire the official languages of the state, which are English and French (Wolff, 1998).

The question of linguistic diversity has naturally arisen in the **European Union** as well. The Community has always emphasised the necessity of multilingualism, which was expressed especially openly in the *Communication on Multilingualism* (2005). After defining the term multilingualism[6] the *Communication* takes into consideration the major areas where multilingualism plays a special role (e.g. academic life and education, economy, mobility and employment). Moreover, the document states: *"The Commission [...] urges member States to take additional measures to promote widespread individual multilingualism and to foster a society that respect all citizens' linguistic identities."* (Communication, 2005, p.15)

1.3 Linguistic diversity

By the beginning of the 21st century the debate about mono- vs. multilingualism has been closed in the European Union: all the official EU-documents promote multilingualism. The system is well described by Dieter Wolff (1998), according to whom pre-school education is the field of linguistic immersion and primary school is that of conscious language use. Instead of traditional language teaching in the secondary education, Wolff is very much in favour of

[5] An amendment to the Constitution which proposed English to become the only official language of the USA.

[6] "Multilingualism refers to both a person's ability to use several languages and the co-existence of differentlanguage communities in one geographical area." *Communication* (2005, p. 3)

content-based language learning (CLIL), where students not only learn a foreign language, but study different school subjects (e.g. art or science subjects) in a foreign language.

CLIL is the practical manifestation of the European idea of **“mother tongue plus two”**, which was introduced in 2006 by Leonard Orban, who at that time worked as the Commissioner for Multilingualism in the European Commission. It was a recommendation that aimed to develop language teaching with introducing two foreign languages besides one’s mother tongue. Although the “mother tongue plus two” model can guarantee multilingualism, it is interesting to examine which languages are learnt in the Union. Nobody is surprised that according to the Eurobarometer-survey (Europeans, 2006) English is learnt as a foreign language by the majority of Europeans (38%). German with its excellent geopolitical location and French as an (ex-)rival of the English language tied for second place (14%-14%). From among the Slavic languages, Polish is mentioned (1%), and, not an official EU-language though, Russian is also learnt by 6% of European citizens (Figure 4).

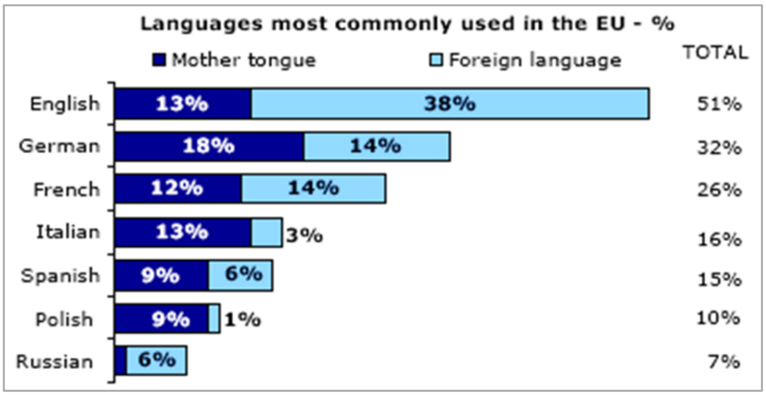


Figure 4. The most commonly used languages in the EU
(Europeans, 2006)

The numbers may speak about the dominance of the English language all over Europe, the rivalry between French and German in certain places of the European Union, and about the political changes in the eastern part of the continent.

Comprehensive questions and study activities:

- Which are the four basic language families in Europe? Which are the Indo-European sub-families in Europe?
- Which languages belong to the Germanic/ Romance/ Slavic/ Celtic/ Baltic/ Greek/ Albanian families?
- Look at the map (Figure 3). Name three European languages that do not belong to the Indo-European language family!
- Which language family does your mother tongue belong to? Which are the closest languages to your L1 (first language)?
- Is your language the official language of the European Union? How do you think a language can become the official language of the EU?
- The United Kingdom left the EU in 2021 (Brexit). Will English remain the official language of the Union? Yes or no? Why?
- Which language policy do you prefer in a country: monolingual or multilingual? Justify your choice!
- What does “mother tongue plus two” mean? Why not “mother tongue plus one”?
- Which is the most popular foreign language in your country? Why?

- Here you can find a graph about "the second most useful foreign languages" (Figure 5). Find your country and share your opinion about the result.

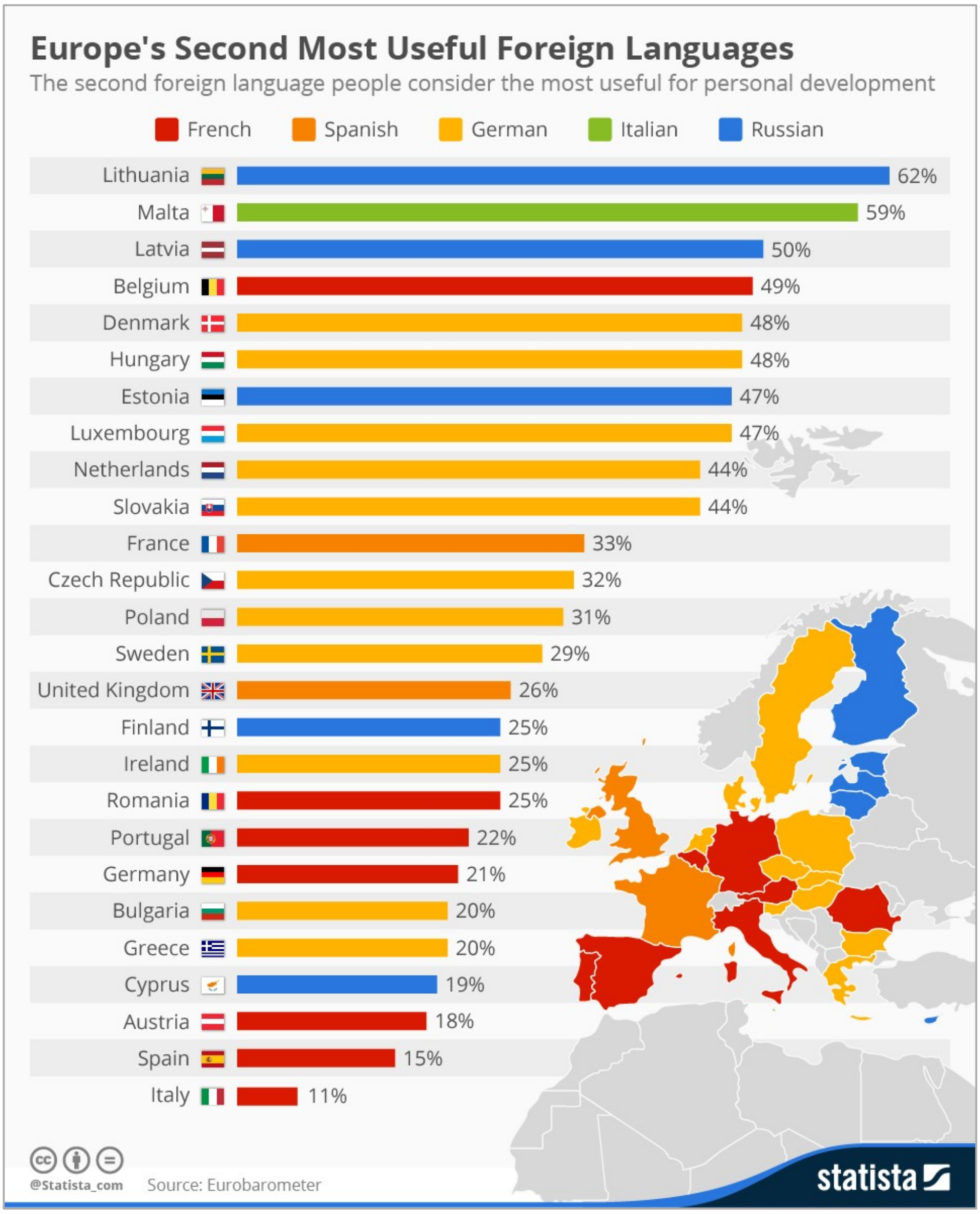


Figure 5. Europe's second most useful foreign languages
(McCarthy, 2015)

2. Bilingualism in education

Learning objectives

Having gained a brief insight into the languages of Europe and the language policy of the EU, regarding linguistic diversity, in this chapter we go on discussing language learning at school putting a special stress on the European priorities in this field. From among the priorities we discuss early childhood start in details as it is important to know the different views on this topic which can be called a hot issue in European language learning today. On the basis of modern research, we will discuss the benefits of language learning in childhood and adulthood.

Moreover, we will make a clear distinction between language learning and language acquisition, which will be called the "alpha and omega" of early childhood language development. In the end, students will be provided with a description of L1 process from the age of 0 to the age of six. The ending questions will focus on students' own opinion and experience on the topic.

2.1. Language learning at school

Language learning and teaching is a very complex area. Knowing this, the European Commission in its *Action Plan 2004-06* (Promoting, 2004) clearly determines the educational scenes where language learning can be more effective and language teaching could be most desirable. These **priorities** are as follows:

1. Linguistic diversity
2. Early start
3. Language learning in secondary and higher education
4. Lifelong learning
5. Language teacher training

As the document suggests, **early childhood language education** is a key element of fostering multilingualism in the EU. The question is how the European Union can promote language learning at an institutional level: in pre-, primary and secondary schools, and also in higher education.

As far as language learning is concerned, **primary schools** may be regarded as "transitional" institutes where children do not only acquire but also learn a language, especially towards the age of adolescence. Children's special characteristics of this life period should be taken into consideration even in language learning. We must not forget that children are at the beginning of a long process, the result of which cannot be immediately recognised.

Adults also tend to overlook two issues. First, the language command of children leaves much to be desired even in the case of their mother tongue. Secondly, even if a child starts acquiring a foreign language early, his or her competence in other fields of life cannot be compared with that of the older students or adults. It is for this reason that children might fail language examinations that demand "adult competences" or life experience (e.g. how to book a room at a hotel or how to apply for a job).

According to a survey on **language education** (Key, 2005), in the majority of the EU countries, more than half of the pupils in primary education learn a foreign language. What is even more interesting and important is the trend regarding the numbers of foreign languages taught in Europe. There are fewer and fewer countries where no foreign languages are taught in primary education. In some countries even two foreign languages are taught at this level. More than 10% of children in Estonia, Finland, and Sweden belong to this group, while Luxembourg with its 80% can be considered exceptional (in Luxembourg there are three official languages).

In **secondary education** the number of students who learn foreign languages practically doubles, which means that by now all European students learn at least one foreign language in general secondary education. The question of a second foreign language is different in the EU-countries. In the Czech Republic, Germany, Malta, Austria and Poland, it is obligatory to choose a second foreign language at the upper secondary level, while in Ireland schools are allowed to decide if they want to introduce it or not.

Although we have dealt with the problem of **linguistic diversity** earlier, it is worth mentioning here in the section of language learning that English is the most commonly learned

foreign language. Those who are for linguistic diversity gladly accept the introduction of a second foreign language in education as it promotes multilingualism. Yet it must be seen that English is the language that is learnt by the 90% of secondary school students even if it is not compulsory. The influence of English is so vast in every area of life that it is impossible to resist. If we cannot – or do not want – to stop it, we should be happy at least to see that a language can be popular even if students are not forced to learn it.

2.2. Early start of language learning: pros and cons

Although the trend of starting to learn foreign languages earlier is obvious, there are still some fear and reservations about it among educational professionals and laymen as well. What are **the pros and cons** of early language learning? According to Kovács's (2009, 2017) pedagogical research the most popular cons are as follows:

"1. Pre-school children are immature for heavy mental strains.
2. First the mother tongue should be learnt perfectly.
3. Early childhood language acquisition does not have measurable benefits.
4. Foreign language learning takes away time from playing.
5. There are not enough professionals in this field." (Kovács, 2017, para 3)

On the basis of some other researchers (Bartha, 1999; Baker, 2000, 2007, 2011; Diamond, 2010) and existing good practices (Jó, 2009; Kitzinger, 2009, 2018, 2020) we may give the answers to the above mentioned fears:

1. Learning a foreign language is a different activity for a child (acquisition) and for an adult (learning). Therefore, brain is not more burdened than in the case of acquiring L1.
2. Our brain possesses an unlimited place for storing languages. Languages do not exclude but complete each other.
3. The lack of measurable benefits may be true for every other activity in early childhood (cf. mathematical competence). However, using different codes support diversity in thinking.
4. Language acquisition is never separated but integrated into activities (e.g. physical exercises or singing) and connected with senses. Therefore, language acquisition, with the suitable methods, is an organic part of playing.
5. Today there are more and more teacher training faculties which train pre-school teachers with foreign language specialisation on BA level.

Whether **bilingual children** have advantages over monolinguals is still a question. On the basis of worldwide research Baker (2007) declares that bilingual children are in a favourable position as far as **flexibility, creativity and divergent thinking** are concerned. They seem to be more sensitive to communication and they are much more able to concentrate on the meaning than the sound of a word: for them a similar word to 'cap' is 'hat', and not 'cat', which sounds more similar to 'cap'. Also, they tend to be much more inventive if they are asked about the use of a certain object. Baker (2007) is confirmed that the reason why bilingual children's intelligence was underestimated until the 1960s was due to the wrong assessment systems: the wrong language choice of IQ tests (they had to be filled in in the children's weaker language) or other "mitigating factors, of a sociolinguistic nature related to the learners' immigrant status" (Cenoz & Genesee 1998, p. 21). At the same time Baker does not tell us

whether the advantage might be considered temporary or it will accompany children throughout their lives.

Another researcher, Diamond (2010) examines bilingualism from the part of **infants and old people** and finds that bilingualism has advantages at both ages. Infants can have cognitive benefits which may affect their life later as bilingualism, based on "executive function" (2010, p. 332), advances to cope with different inputs: what children already know from possessing two languages (e.g. lexical flexibility) can be beneficial in other areas of life, especially in situations where one has to adapt to unpredictable situations or distracting stimuli have to be coped with. This latter function of the brain is called "executive function" (2010, p. 332) whose forming goes on in the prefrontal cortex which can be developed in the first 5 years of our lives. As far as old people are concerned, bilinguals' Alzheimer's symptoms appear 5 years later. Diamond makes a parallel between physical exercise's beneficial effects on body and mental exercise's positive effects on brain and mental diseases. The bilingual brain's best exercise is practising two languages as a bilingual continuously keeps himself/ herself asking: *"Shall I think, speak, or interpret sounds spoken to me according to the arbitrary rules of language A, or language B?"* (2010, p. 333).

2.3. The process of language acquisition

How age appears in language learning it is the best if a few examples from our field, i.e. early childhood, are taken into consideration. Lundberg (2007) concludes that very young children in pre-school can profit from language acquisition just as much as older students do at school. Two surprising facts are mentioned in his study: firstly, **very young children** can pick up language at an astonishing speed through songs and rhymes, and secondly, children cannot benefit linguistically as much from computer-related games as they had been expected to. What all teachers agree is the stimulating and very effective role of songs and the use of illustrative materials through total physical response (TPR) activities. These activities encourage children to use the target language bravely, which will result in a relaxed and natural atmosphere that promotes communication.

If we want to base our pedagogical practice on the differences of children's and adults' learning characteristics, we must draw distinction of **language learning** and **language acquisition** as this is the alpha and omega of early childhood language development. If we want to reckon on young children's age-appropriate features, the first we have to notice is that very young children do not learn but acquire L2. It entails a holistic pedagogical attitude where the pre-school programme is absolutely adjusted to children's age characteristics and the methods of L2 development does not differ much from those of L1 development.

The term **language learning and acquisition** comes from Krashen (1981), who in his Natural Approach made a distinction of the types of language learning. His theory has been closely examined from the aspect of language pedagogy as well. Acquisition is often connected with the mother tongue and learning is with foreign languages. However, it is only partially true, as a second language can also be acquired, e.g. during travels in a foreign country and the mother tongue can also be learnt, e.g. if one has to learn the terminology of a profession. Therefore, L2 teaching methods should be very similar to those of mother tongue development.

To understand this, we should examine **the process of how a human acquires his/ her mother tongue.** The actual speech production is not without antecedents. Already on the first day the infant is able to make a distinction between her mother's voice and other voices and by the second week he/ she can distinguish between human and other voices.

Then the following pattern can be traced (slight overlaps can be noticed) in the 'foundation year' (Crystal, 1995, p. 430):

- the first 2 months: primitive vocal sounds production during hunger, pain and physical discomfort
- between 6 and 8 weeks: cooing, which means typical short vowel-like sounds preceded by consonants which will develop into a varied string of sounds
- between 3 and 4 months: cooing is replaced by vocal play which is a combination of practice and experimentation
- from the 6th month: babbling has different periods, first it involves repetitive consonant and vowel-like sounds (e.g. 'bababa'), then at around the 9th month the repetition is replaced by more creativity by forming new syllables which will lead to adult-like words like 'mummy' or 'daddy'. Babbling for a while stays parallel with real talking.
- at around the 12th month: proto-words appear with clear sounds but unclear meaning.

Between the age of 1 and 2 years both receptive and productive skills develop rapidly (Gósy, 1997). Children are able to understand speech globally, with less and less help from mimics and gestures. (However, we must not forget that meta-communicative elements play an important role. By the age of 2 "key-word" strategy is followed (1997, p. 29) which means that children are able to "find out" the missing elements of communication on the basis of some already known words. It is also the period of "double storing" (1997, p. 29) that involves saving two varieties of pronunciation: the adult's and the child's own variety for the same word. On a more developed level the adult's variety will exclude the child's own version(s). By the age of 3 a child is able to elaborate the different linguistic characteristics of speech (e.g. acoustic, phonetic, grammatical, semantic features) which serve as the bases of interpretation.

Few researchers deal with the characteristic features of **pre-school children's speech products**. Yet, it is a crucial point that kindergarten teachers should be aware of the major levels of mother tongue acquisition. Gósy (1997) explains it and gives a review referred to children with Hungarian L1 (Figure 6):

Age	Linguistic levels of L1	Linguistic development of L1
3rd year	phonetic	• articulation is getting more stable and consequent • all vowels appear in speech; vowel harmony gets relevant • - consonants appear (except for the alveolar trill [r]), but their appearance is lexis-dependant; consonant rules are uncertain
	morphological	• in children's mental lexicon adults' variations are activated (vs. their own individual variations) • parts of speech: first nouns are dominant, then gradually more and more verbs appear
	syntactic	• telegraphic speech is replaced by multi-word sentence patterns → pseudo-sentences • compound sentences appear (with or without conjunctions)
	other	• tense relations cause problems • grammar becomes more important than accurate pronunciation

4th year	phonetic	• all speech sounds appear in speech including [r]
	morphological	• verbs are dominant • vocabulary is extended rapidly • more complicated parts of speech appear (e.g. postpositions) • verbs are used in all persons and numbers
	syntactic	• the appearance of subordinate clauses • the most complicated structures appear (e.g. conditionals)
	other	• communication strategies develop sharply
5th year	phonetic	• paradox: pronunciation of sounds is good, yet in certain words earlier physiological errors can be observed
	morphological	• suffix system is strongly developed • vocabulary (especially passive) develops
	syntactic	• sentences get longer and often connected with conjunctions
	other	• fluent communication, details are elaborated
6th year	phonetic	• sound production becomes independent on context, i.e. they can be pronounced well in any context
	morphological	• vocabulary (also active) develops both on quantitative and qualitative bases
	syntactic	• syntactic relations are enriched: children are able to express more complex and complicated contents in compound sentences
	other	• mother tongue perception base has been developed

Figure 6.
Pre-school children's speech production on the basis of Gósy (1997)

Age affects language learning (Navracsics, 2007). As the **mental lexicon** can be developed in different ways at the different age levels, this should be a starting point in foreign language teaching, too.

Comprehensive questions and study activities:

- Which are the priorities of language learning and teaching in the EU? Which of these priorities do you find the most important in the case of your country's language education policy? Why?
- When do you start learning a foreign language in your country? How many foreign languages are taught in different schools?
- To what extent does your country promote linguistic diversity? Give examples!
- Are you for or against early childhood language acquisition? From what age do you think foreign language development should be started?
- Do you agree with the researchers (Chapter 2.2) on the benefits of language learning in young and old age? What is your experience?
- After reading about the difference between language learning and language acquisition, fill in the next table (Figure 7). (You can check yourself with the key under the exercises):

Aspects	Language acquisition	Language learning
Mental control	(1) …………………………..	Conscious
Aim	To convey message	To convey (2) ……………… about the language
Focus on	Language (3) ………………	Language form
The most important value	Risk taking	(4) …………………………..
Teacher's role	(5) …………………………..	Prescribing, leading, checking
Learner's role	Sensing rules	(6) ………………….. rules
Error correction	Not suggested because it causes (7) …………………………..	Obligatory part of the process
Communication	Process-like	(8) …………………….…-like
Efficiency	(9) …………………………..	Relatively fast

Figure 7. Krashen's (1981) language acquisition and language learning distinction
adapted from Kovács & Trentinné Benkő (2014)

- 7. In Figure 6 you can find the stages of L1 acquisition referring to the Hungarian language. Look at the table and try to find similarities and differences with your own mother tongue acquisition process. Point out the crucial points, e.g. special sounds or vocabulary.
  Key to Ex. 6: (1) Subconscious, (2) knowledge, (3) function, (4) Accuracy, (5) Partnership, guidance, (6) Following, (7) inhibitions, (8) Product, (9) Relatively slow

3. From theory to practice: how to implement a bilingual programme in the kindergarten?

Learning objectives

The chapter shows, on the basis of an existing programme, a possible way to implement a bilingual programme in the kindergarten: what kind of method(s) are worth considering, what the basic principles and aims of the programme are and what kinds of activities are worth taking into consideration while dealing with the young ones in a foreign language. Besides presenting the complex features of the implementation of a foreign language programme the chapter also provides readers with a sample of an English session made by a teacher trainee. The reflection of the trainee and the comprehensive questions make the students think about whether, with the help of this model, they can think of something similar in their own setting, i.e. whether this model can be adoptable; and if yes, how?

3.1. The kindergarten method

Implementing a foreign language programme in an affiliated kindergarten of a university has a double aim: while the programme is used among the kindergarteners, a solid theoretical and practical background has to be given to kindergarten teacher trainees at the university as well. At the same time teachers at the university and teachers in the kindergarten have to collaborate on a daily basis as the two fields, i.e. language development in the kindergarten and training at the university are inseparable as they continuously inspire and complete each other. Here we focus on the kindergarten: the method, the programme and the activities.

First of all, a kindergarten programme has to be set with the basic aims and principles, then appropriate activities have to be attached to it. Even before setting down to compile the programme, the first question should be *What kind of method(s) to apply in the kindergarten?*

In early childhood education there are **two basic methods**:

1. *one person – one language* method and
2. *playful bilingual method*.

According to the first method there are two teachers present in the kindergarten where one teacher is a native speaker of the given foreign language and the other is a non-native speaker (Busch, 2011). This model tries to imitate the natural state present in mixed marriages where spouses' L1-s are different. The advantage of the method is that the child acquires an authentic language, which has special relevance, for instance, regarding pronunciation. Children can usually make difference between the speakers and they can select the languages (which L to use with which person) in everyday communication easily. If the method is used regularly and consequently, the language process can be at a natural speed and the results can be impressive. The disadvantage of the method is that it cannot be implemented easily under institutional circumstances, mostly due to the lack of well-trained native language teachers. Although progress seems to be slower in the case of the second method, it also proves to be more practical and more easily established. In this method the kindergarten teachers themselves become *bilingual models* for children who may acquire a foreign language in a playful and motivating way.

3.2. The kindergarten programme

English in the kindergarten specialisation at Benedek Elek Faculty of Pedagogy was introduced in 2006 and was implemented in the affiliated kindergarten of the University of Sopron, Hungary from February 2007. Before this time only programmes of different national languages (e.g. German, Croatian, Slovakian, Serbian, Slovenian, Romanian and Romani) had been developed in the kindergarten. As the faculty had been running German as an ethnic language programme since 1959, it was obvious that some of the basics, with some special modifications, were integrated into the new English language programme as well. First, the programme was built in an already running Hungarian programme, but four years later it was revisited and reshaped.

The new programme was titled ***Playful English language acquisition*** *with a detailed methodological guide* (Soósné, 2010). In its foreword the programme mentions the new European trends of foreign language learning and the new era where early childhood language development has a special place. It describes the psycho- and sociolinguistic background of language acquisition, then it enumerates the different educational areas in the kindergarten from the aspect of language development. It specifies the learning form and methods where foreign language may appear and delineates the structural frames and the available material conditions. The programme is supplemented with sample English session descriptions and methodological guidance. The richly illustrated programme sets motivating small children to acquire a foreign language as its basic goal and it plans to reach this via conscious code-switching of L1 and L2. Playfulness is considered to be the key to motivation and positive attitude. It also gives a pedagogical standpoint about the commitments of the teacher.

According to the programme the kindergarten teacher has to

- *“give children the chance of natural language acquisition through play*
- *provide children with language input through listening*
- *motivate children through activity-oriented situations*
- *create an emotionally stable relationship with children*
- *provide children with a wide range of experience through the senses (hearing, seeing, moving)*
- *provide a rich methodological repertoire regarding activities and equipment.”*

(Soósné, 2010, p. 3)

3.3. Activities in the kindergarten

When we speak about foreign language development in the kindergarten, we may notice that **foreign language activities are not separated from other activities**. What really happens is that we use a different language, i.e. we change the code (*code-switching*). It is important to know that the vocabulary of a foreign language does not necessarily transmit new knowledge. For instance, if we learn the name of numbers, colours or the parts of body in a foreign language, our knowledge about the world is not extended. It is worth bearing it in mind as it explains why the same activities and aids can be applied both in L1 and L2 development.

As the programme suggests, the base of every activity in the kindergarten is ***play***. Foreign language can be adopted easily in role play or guided play to acquire basic vocabulary. Moreover, instructions can also be given in the foreign language; with some body language where necessary. This is the reason why memory games, card and board games can be popular in foreign language development. *Literary and music education* are also very often connected to each other (Figure 8). Rhythm, movements, melody have an important role in getting familiar with English songs and rhymes as they all help the phases of learning and later it is much easier to remember words and phrases accompanied by music or movement. According to the rules of acquisition, vocabulary, pronunciation and intonation will be learnt imperceptibly. In the case of tales, it is worth telling (or dramatising) a tale in L2 which is already known in L1.



Figure 8. Singing and music with Adrienn Lovász[7]

[7] All the pictures and educational materials are presented here with the kind permission of the actors.

Songs, rhymes and speech panels can also be embedded in *visual education* and short dialogues can be initiated relating to the visual product. In *environmental education* children can get acquainted with words and notions already know in L1; it refers to the natural phenomena of acquisition as well. At the changing of the seasons, for instance, children can welcome Froggy (Figure 9), the ‘weather forecaster’, who can tell the weather report in English.



Figure 9. Environmental education with Petra Bontó, Froggy and Pussy cat

While making trips, it is also possible to use the foreign language as “there is infinite potential in the woods, in the fields, on the river banks, and on educational trails; we just have to move out from the closed classrooms to the ‘open ones’“ (Molnár, 2019, p. 94). Basic *mathematics* (numbers) can also be introduced in L2, just like the *characteristic features* of objects, plants and animals (colours and size). *Work-like activities* (cooking, baking and gardening) can also offer the chance to switch the code. Music and *moving* (physical exercises, dancing) have an invaluable importance in foreign language development. In the case of physical education a special vocabulary (e.g. prepositions and adverbs of directions) can be developed. All these activities demand conscientious preparation from the teacher in order to get children acquainted with a foreign language.

3.4. Early English in action

By this point we have discussed the basics of the possible and most appropriate early childhood methods in language development. We also introduced a language educational programme that was carefully tailor-made to the needs of the given kindergarten. Now it is time to **focus on practice** with the help of a kindergarten teacher trainee, Petra Rádóczy, who did her kindergarten practice as a student of Benedek Elek Faculty of Pedagogy, Sopron, Hungary.

3.4.1. A sample English session for the very young

First we get to know a part of her **kindergarten journal** where she planned her English session. It is every student’s task to plan and describe their future activity in the kindergarten. The form is set: it is made up of some general data which is followed by a table of activities. Here you are (Figures 10 and 11):

English session

Name of kindergarten trainee: *Petra Rádóczy*
Group: *Mixed age*
Kindergarten programme: *Playful English development*
Previous activities: *Discussing autumn weather*
Form of activities: *Dramatising songs with movements*
Aims:
Educational aims: *aesthetic education, singing clearly, socialising in games*
Language educational aims: *developing foreign language through play and movements, developing vocabulary, expressing English lyrics with gestures and movements*
Cultural aim: *Getting acquainted with English nursery rhymes and songs*
Competences to develop: *Communication, cognitive skills, observation*
Methods: *conversation, presentation, action, practice, checking, feedback (positive)*
Aids: *plush teddy bear, weather chart, plush shark (finger puppet)*

Activities		
Time	***Process***	***Methods, aids, comments***
3 min	***1. Organisational tasks:*** *I put the chairs in a semicircle on the carpet and prepared the necessary aids.*	*Set organisational structure.*
3 min	***2. The session:*** *I start the session with the song* Good morning *(already known by children)*	
2 min	*We have already practised introduction.* *I ask every child their name.* *Then we count the girls and the boys with the help of Teddy bear.* *We also say what the weather is like today (weather chart).*	*First I introduce myself in order to motivate children to do the same.* *The song and the plush bear will draw children's attention to the activity.* *Developing communication and language skills.*
3 min	*We repeat the song* Walking, walking. *We sing it several times while changing the volume of the song.*	*I try to apply simple and well-known songs.*
4 min	*We have already acquainted with our parts of body with the song* Head and shoulders. *Children will pay attention to the changing of the rhythm.*	*We are playing in a circle.* *Changing the rhythm makes the song more entertaining.*
3 min	Teddy bear, teddy bear *is also a popular song among children. With a plush bear we follow the movements indicated in the song.*	*Practising a well-known rhyme with the help of a plush bear.*
4 min	*With the song* Hokey Pokey *we also aim to remember and practise parts of body.*	*We repeat the song several times using the different names of our parts of body.*
4 min	If you're happy… *is a song known in Hungarian*	*Playful activities; according to the age*

 4 min	*by the children. They imitate my movements.* Baby shark *is the next well-known song. We play it together. While playing, the finger puppet shark will be passed on to the next child.* *Vocabulary for the topic:* *weather, sunny, cloudy, teddy bear, body parts (head, shoulders, knees, toes etc.), movements (running, walking, jumping, turning around), animals: shark, bear; numbers*	*characteristics of the children.*
 2 min	***3. Ending the session:*** *Children will tell me their favourite rhymes and we will recite and act them out.*	 *Acting out children's favourite songs/ rhymes will make children more interested in the activity.*
 1 min	***4. Feedback, assessment:*** *Continuous praise as positive feedback during and after the activities.*	 *With positive feedback children's self-esteem will increase and will be brave enough to take part in English activities later.*

Figure 10. An outline of an English session of Petra Rádóczy



Figure 11. Children of the English session with Petra Rádóczy

3.4.2. Reflection by the kindergarten trainee

In the following part we can read the **student's reflection** on her English session. As a part pf their journals students put down what they have done in the kindergarten with a short assessment. This serves as a part of the pedagogical process and also as a psychopedagogical approach that can be beneficial for students' future profession. Naturally, students' writings and practical work are discussed with their mentor and at the end of the session with their fellow students and teacher trainer as well.

Reflection

While planning the session I intentionally concentrated on a gradual approach, and took children's age and individual characteristic features into consideration. I tried to choose simple, easy-to-learn songs as some of the children have just started English. I also paid attention to motivation and tried to keep children interested throughout the session. I wanted to involve each child in the activities.

At the beginning of the session I greeted the children and introduced myself so that they could get an example of introduction, too. My special intention was to create a loving, tolerant and relaxed atmosphere and tried to integrate early language development into a playful form. I also find important to provide children with activities where movements are in the limelight, thus, I have chosen songs and rhymes that could be accompanied with movements. With the chosen methods I also intended to develop children's experience and fantasy.

To most songs I also created and brought in special aids, because I think these make sessions even more interesting and serve as a magnet to their attention; especially at the beginning of the year. The plush teddy bear was going around during the song Teddy bear, teddy bear, turn around *(Appendix 1), so that each child could have them while they were imitating the necessary movements.*

Song popular among children served to increase children's attention and interest. Therefore, I closed the session with a song well-known to them: Baby shark *(Appendix 1). To this I also sewed a finger puppet to develop children's aesthetic sense and taste as well (Figure 12 and 13).*

What I especially found relevant here is to emphasise and build upon children's emotions. With positive emotions learning will be more effective as these feelings will remain and some positive attitudes are attached to them. The various methods were carefully adjusted to children's age and development in order to make the session playful. Besides playfulness, children's desire to communicate and their needs for exercise had to be fulfilled, too.

I think I managed to achieved what I had planned. Every child took part in the playful English session and what I noticed was joy and happiness on their faces.

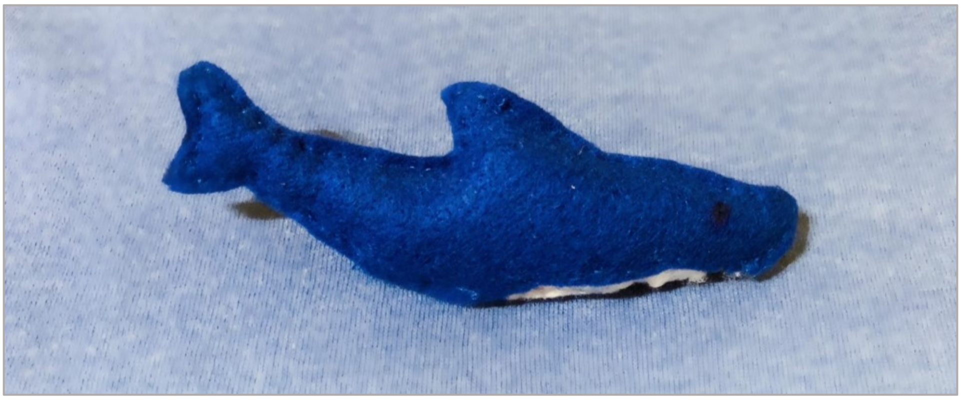


Figure 12. The baby shark sewn by the student



Figure 13. Baby shark: acting out

Comprehensive questions and study activities:

- Which method would you use with young children: one person – one language method or playful bilingual method? Justify your choice!
- Which are the educational fields where foreign language development can easily be integrated into a kindergarten programme (Chapter 3.3)? Why?
- Choose a topic from the following list and collect 3-5 songs and rhymes that go with the theme. How would you use them (e.g. methods, aids, order of activities)?
    - *Greetings and family*
    - *Colours and numbers*
    - *Wild and domestic animals*
    - *Travelling in the water and in the air*
    - *Weather and clothing*
- Write 5 questions that you would ask from Petra on the basis of her journal and reflection (Chapter 3.4).

4. Conclusion and acknowledgement

Both learning and teaching foreign languages are fun. There is no area of life where a foreign language could not teach us something new, something exciting and something which may become a part of our identity. In this short journey in the world of languages one of the aims, along with supplying some food for thought, was to extend our knowledge on our present age (both individual and historical) and find our place in it as a teacher. To achieve these aims we started to get familiar with the language families in Europe, then got to know some social and education models that follow mono- or multilingualism. We examined how language learning works and what kinds of methods to use to be successful especially with young children. After the theoretical parts we jumped into some present-day situations where early childhood foreign language education is handled with special care. Although material conditions are important in

a kindergarten, I do believe that without dedicated educators it will not function. Therefore, I want to catch the opportunity to say special thanks to my colleague, Györgyi Soósné Orbán, who taught me how to introduce English into the kindergarten and my (ex-)students, Adrienn Lovász, Petra Bontó and Petra Rádóczy, who continuously teach me how to survive and revive in teaching and research. For the readers who have reached this point I wish good luck and persistence in their present studies and their future career.

REFERENCES

Baby shark (2021). Retrieved January 20, 2021, from
URL: https://nl.pinterest.com/pin/311311392993193349/ [2022.03.22.]

Baker, C. (2000). *The Care and Education of Young Bilinguals: An Introduction for Professionals.* Clevedon· Buffalo·Toronto·Sydney: Multilingual Matters.

Baker, C. (2007). *A Parents' and Teachers' Guide to Bilingualism*. (3rd edn.). Clevedon·Tonawanda·Ontario: Multilingual Matters.

Baker, C. (2011). *Foundations of Bilingual Education and Bilingualism.* (5th edn.). Bristol – Buffalo – Toronto: Multilingual Matters.

Baron, D. (nd). *The Legendary English-Only Vote of 1795.* Retrieved January 20, 2021
URL: http://faculty.las.illinois.edu/debaron/essays/legend.htm [2022.03.22.]

Bartha, Cs. (1999). *A kétnyelvűség alapkérdései.* Budapest: Nemzeti Tankönyvkiadó.

Beth's Music Notes (2021). Retrieved January 20, 2021
URL: https://www.bethsnotesplus.com/2013/05/teddy-bear.html [2022.03.22.]
DOI: https://doi.org/10.32964/TJ20.1

Busch, B. (2011). Trends and innovative practices in multilingual education in Europe: An overview. *International Review of Education,* Vol. 57, Issue 5-6, pp. 541-549.
DOI: https://doi.org/10.1007/s11159-011-9257-1

Cenoz, J. – Genesee F. (1998). Psycholinguistic Perspectives on Multilingualism and Multilingual education. In Cenoz, J. – Genesee F. (Eds.), *Beyond Bilingualism: Multilingualism and Multilingual Education,* (pp. 16-34). Clevedon·Philadelphia – Toronto·Sydney·Johannesburg: Multilingual Matters.

Communication on Multilingualism, Brussels, 22.11.2005. COM (2005) 596 final. Retrieved January 20, 2021
URL: https://bit.ly/3Jwxxwd [2022.03.22.]

Crystal, D. (1995). *The Cambridge encyclopedia of the English language*. Cambridge: Cambridge University Press.

Diamond, J. (2010). The Benefits of Multilingualism. *Science,* Vol. 330, No. 6002, pp. 332-333.
DOI: https://doi.org/10.1126/science.1195067

Europeans and their Languages (2006). Retrieved January 20, 2021
URL: http://ec.europa.eu/public_opinion/archives/ebs/ebs_243_sum_en.pdf

Gósy, M. (1997). *Beszéd és óvoda.* Budapest: Nikol Gmk.

„Jó gyakorlat" az óvodáskorú gyerekek idegen nyelvi fejlesztésében. (2009). Nemzeti Erőforrás Minisztérium. Retrieved January 20, 2021
URL: https://bit.ly/3Ivfw00 [2022.03.22.]

Key Data on Teaching Languages at School in Europe (2005) European Commission.

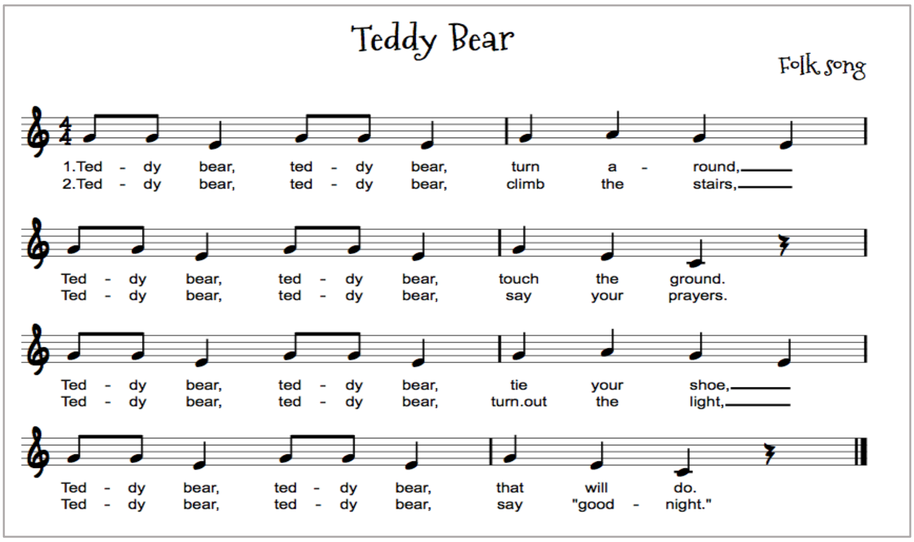
Kitzinger, A. (2009). Children in our Multilingual-Multicultural Europe. In Tengerdi, A. –Varga, L. (Eds.), *A gyermekkor narratívái,* (pp. 17-29.). Sopron: Edutech.

Kitzinger, A. (2018). Multilingual and Multicultural Education in a Hungarian Model. *Studia Paedagogica Ignatiana*, 21 : 3 pp. 67-83.
DOI: https://doi.org/10.12775/SPI.2018.004

Kitzinger, A. (2020). Az Angol nyelv az óvodában specializáció szociolingvisztikai háttere és nyelvpedagógiai megvalósítása a Soproni Egyetem Benedek Elek Pedagógiai Karán. In Patyi, G. (Ed.) *"...hajtás sarjad gyökeréből." (Iz 11,1) : Hatvan éves a soproni felsőfokú óvodapedagógus-képzés,* (pp. 75-93.) Sopron: Soproni Egyetem Kiadó.
Kovács, J. (2009). *A gyermek és az idegen nyelv.* Budapest: Eötvös József Könyvkiadó.
Kovács, J. (2017). *Az óvodáskori nyelvtanulás mint jelenség.* Retrieved January 20, 2021
URL: https://raabe.hu/az-ovodaskori-nyelvtanulas-mint-jelenseg/ [2022.03.22.]
Kovács, J. – Trentinné Benkő, É. (2014). *The World at Their Feet.* Budapest: Eötvös József Könyvkiadó.
Krashen, S. (1981). *Second Language Acquisition and Second Language Learning.* Oxford: Pergamon.
Lundberg, G. (2007). Developing teachers of young learners: in-service for educational change and improvement. In Nikolov, M. – Mihaljević Djigunović, J. – Mattheoudakis, M. – Lundberg, G. – Flanagan, T. (Eds.), *Teaching modern languages to young learners: teachers, curricula and materials,* (pp. 21-34). Strasbourg: Council of Europe Publishing.
McCarthy, N. (2015). *Europe's Second Most Useful Foreign Languages.* Retrieved January 20, 2021
URL: https://bit.ly/3qnpevq [2022.03.22.]
Molnár, K. (2019). Kompetencia alapú természetbeni tanulás, változatos tanulás-szervezés pedagógusjelölteknek = Competence-Based Learning in Natural Environment, Diversified Organization of Learning for Teacher Trainees. In: *Tanulmánykötet Mészáros Károly Tiszteletére 2019. Sopron:* University of Sopron, pp. 93-102.
My English website (n.d.). Retrieved January 20, 2021
URL: https://myenglishwebsite.wordpress.com/varieties-of-english [2022.03.22.]
Navracsics, J. (2007). *A kétnyelvű mentális lexikon.* Budapest: Balassi Kiadó.
Promoting language learning and linguistic diversity, An action plan 2004-06. (2004). Luxemburg: European Communities.
Soósné Orbán, Gy. (2010). Játékos angol nyelvelsajátítás gazdag módszertani repertoárral. A soproni Lewinszky Anna gyakorlóóvoda angol nyelvi programja [online]. Retrieved January 20, 2021
URL: https://bit.ly/3qm5fgz [2022.03.22.]
State Library New South Wales (n. d.). Retrieved January 20, 2021
URL: https://www.sl.nsw.gov.au/stories/shakespeare-library/shakespeare-room [2022.03.22.]
Wolff, D. (1998). "L'Europe sera multilingue ou elle ne sera pas". Megjegyzések az európai többnyelvűséggel és nyelvi uniformizálódással kapcsolatban. Modern Nyelvoktatás, Vol. 4, Issues 2-3. pp. 3-11.

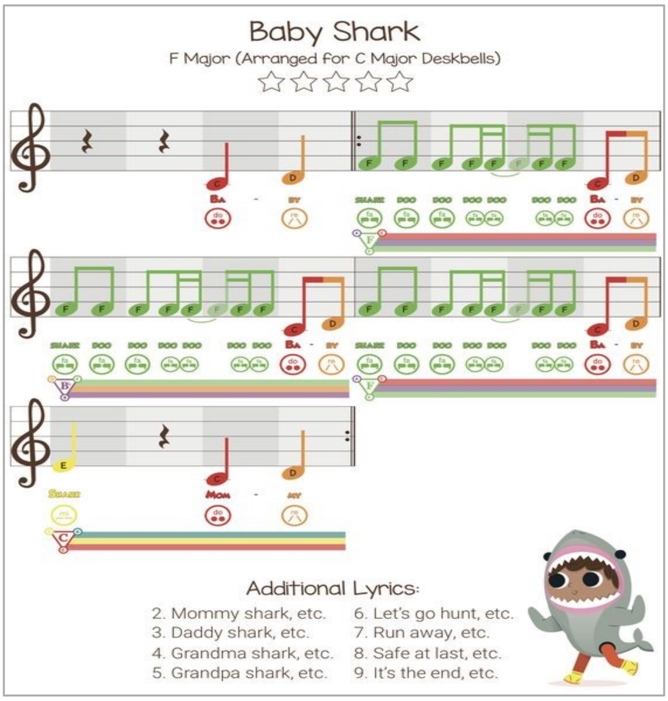
APPENDICES

APPENDIX 1



Source: Beth's Music Notes (2021)

APPENDIX 2



Source: Baby shark (2021)

https://doi.org/10.35511/978-963-334-425-5-KissneZsamboki

Réka KISSNÉ ZSÁMBOKI

TEACHING MATHS AT EARLY YEARS – FROM LECTURE METHOD TO DISCOVERY APPROACH

1. Activity based learning at early years

Early years play a crucial role in the complex and harmonious development of personality, in early cognitive processes and in social learning. Children's individual development is determined by genetic conditions, the specific features of maturation and the spontaneous and planned environmental effects. A young child is a self-constructing personality, whose development requires favourable conditions in which movement, play, activity, curiosity and children's interest can play an essential role. In this process, the child will also gain rich mathematical experience and develop numerical skills and competences. The purpose of this work is to draw attention to the importance and necessity of activity based learning and teaching in the light of the theoretical background, early mathematical skills and teaching methods of pre-primary education.

Learning objectives

There is rich national and international literature on the scientific approach to child development. The concept of biological maturation includes that development has a genetically determined characteristic of human nature. Contrary to the theory that emphasizes maturation dominance, the theory of learning states that development in a childhood personality and activity is appropriate in a good environment (Pléh, 2010). They believe that the individual is shaped by his or her environment throughout his or her life, through reward and punishment. Learning theory reflects a high degree of optimism in terms of teachability, but also conveys the hidden message that if the child's development is inadequate, then his or her environment may be responsible (Pléh, 2010). The 21st century learning theories explain the need to provide the child with a stimulus-rich material environment suitable for exploration. We need to allow children to act independently, which helps them learn.

1.1. Theories about learning

According to the creator of social learning theory (Albert Bandura, Canadian psychologist), observing the behaviour, emotions, and attitudes of others is an important form of children's learning. The active attention of the child during social learning is essential. It has been observed that children only imitate positive models that are important to them. Therefore, we must constantly strive to improve our behaviour, thinking, relationships, etc. to give good patterns for children to imitate (Pléh, 2010).

Perhaps the most interesting theories for the development and development of mathematical competences are the concepts of neuropedagogy, which emphasizes cognitive change and the new science of cognitive neuroscience. Jean Piaget, a Swiss psychologist, developed his theory that thinking is the cause of development through observation of his own children and many developmental psychological experiments. At the heart of the theory is the child's worldview, a scheme that the child constructively builds with constant thinking. When they encounter a new phenomenon, they insert it into their previous knowledge (assimilation)

or reshapes their worldview so that the new phenomenon can now be explained (accommodation). This continuous adaptation, that is, learning takes place throughout our lives.

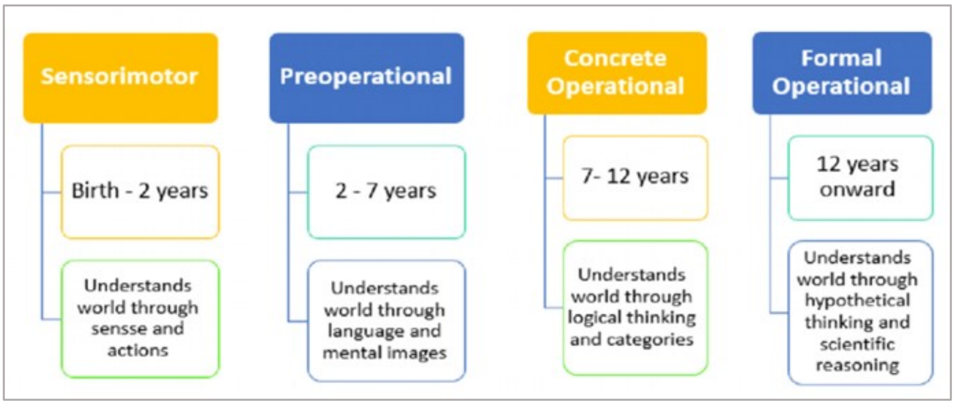


Figure 1. Jean Piaget's learning theory
(https://bit.ly/3N81bu2)

Neurology, cognitive neuroscience, and neuropedagogy teach that the basic structure of the brain is built through a long-term developmental process that begins in fetal life. Brain plasticity is highest in early childhood (the first 5-6 years). More specialized brains later find it increasingly difficult to adapt to very new or unexpected challenges (Schiller, 2010; Varga, 2015). Research from recent decades shows that we are all born with a "programmed" brain that is fundamentally personal and already possesses some basic information about the human and material world in infancy (Klingberg, 2012). Although a child's brain mass is four times smaller than that of an adult, a newborn child's mind contains almost all the neurons that they will use later in life. Growth is facilitated by the formation of a complex network of intercellular protrusions that require a great deal of individual experience. According to Donald Hebb's "Fire Together - Wire Together" theory, the effect of stimuli causes cells with similar functions to signal and begin to project to those that radiate their own signals at the same time. Based on the above, the network of neurons is not only random and not pre-programmed but is formed by experience. Of the synapses that occur, only those that are used regularly remain permanently, and the rest are lost through synaptic backlash (Keysers & Gazzola, 2014).

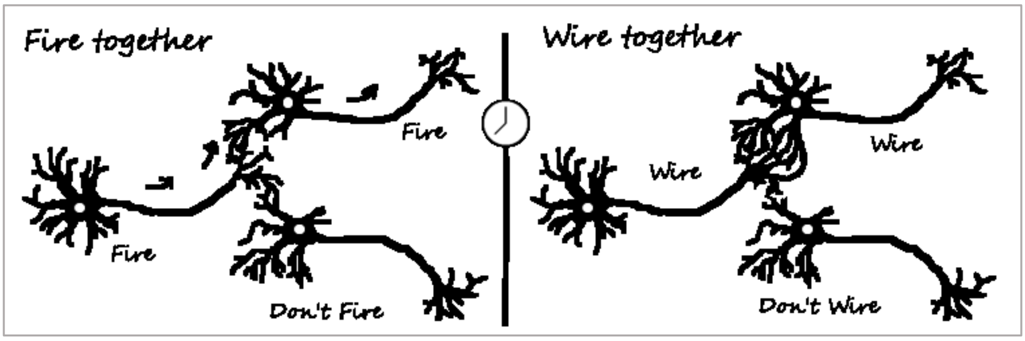


Figure 2. Donald Hebb's "Fire Together - Wire Together" theory
(https://bit.ly/3uiLuaL)

In addition to this basic knowledge, we are born with a very effective learning ability and a basic need for learning. In a sociocultural defined learning process, the children rely not only on their own observations and experiences, but also on the interaction with those around them (Kitzinger, 2009). Thus, the quality of human relationships is crucial for children's learning and development. Daniel N. Stern, a prominent figure in twentieth-century attachment theory,

considers social relationships to be decisive in children's learning. Factors and components that determine a child's personality, such as the development of a positive self-image, a sense of confidence and security, and even self-reflection, are highly dependent on the positive or negative relationships and experiences that are experienced. Positive, credible, direct relationships with children have the power to promote their development in all areas. Thus, the experience gained in early childhood, the characteristics of family life, and the quality of environmental (pedagogical) stimulation clearly influence the healthy development of children and its cognitive, emotional, and social well-being (Stern, 2002).

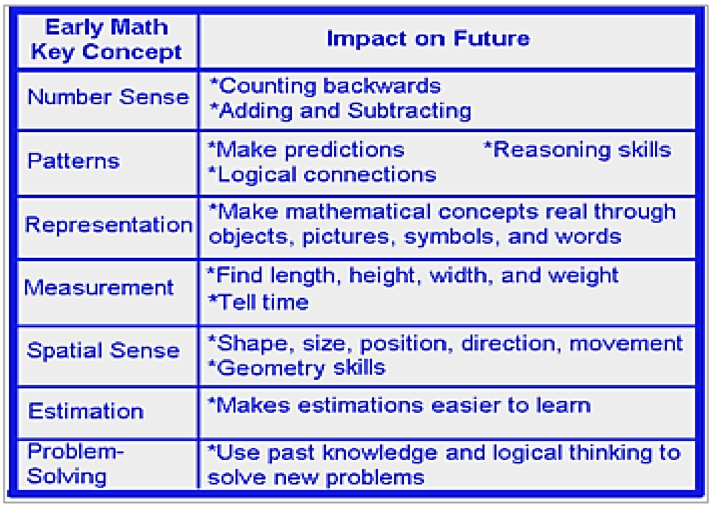
Comprehensive questions:

- What does social learning mean by A., Bandura?
- How did neuropedagogy indicate paradigmatic changes of scientific theories on children's brain development?
- How could you summarise Donald Hebb's "Fire Together - Wire Together" theory?
- What are the main factors and components determining a child's personality?

2. Early math skills

"Early math skills have the greatest predictive power, followed by reading and then attention skills" – reports a psychology squad led by Greg J. Duncan, in School readiness and later achievement.[8] Follow-up studies continue to confirm the importance of early math skills. *"Math is the language of logic* […] *builds reasoning, which leads to comprehension.* […] *Developing a mentally organized way of thinking is critical"* - as it is stated in a research published by Jie-Qi Chen, professor of Child Development at the Erikson Institute.[9] *"Mathematics is the creation of the human mind, at the same time the product of the evolution of the brain and culture,"*[10] says Valéria Csépe, research professor at the Hungarian Academy's Brain Imaging Center. For centuries, the science of early childhood development and mathematics were very distant and incompatible concepts. Thanks to the emergence of the field of intelligence and mental processes, and the emergence of cognitive psychology, we can now speak of mathematical discovery and experience from birth[11].

[8] published in Developmental Psychology in 2007
[9] URL: https://www.greatschools.org/gk/articles/early-math-equals-future-success [2022.03.22.]
[10] URL: http://mipszi.hu/cikk/091212-szamolo-agy [2021.02.01.]
[11] scientific theories of Jean PIAGET, Tamás VARGA and György PÓLYA



Early Math Key Concept	Impact on Future
Number Sense	*Counting backwards *Adding and Subtracting
Patterns	*Make predictions *Reasoning skills *Logical connections
Representation	*Make mathematical concepts real through objects, pictures, symbols, and words
Measurement	*Find length, height, width, and weight *Tell time
Spatial Sense	*Shape, size, position, direction, movement *Geometry skills
Estimation	*Makes estimations easier to learn
Problem-Solving	*Use past knowledge and logical thinking to solve new problems

Figure 3. How Math Skills Impact Student Development
(https://study.com/academy/lesson/how-math-skills-impact-student-development.html)

Tamás Varga, a mathematics teacher, an internationally recognized and distinguished expert in mathematics, pointed out in his articles on "Baby Maths" published four decades ago that the baby's connection with its living and non-living environment through its senses, movements and sounds has elements can be considered to be mathematical (Dienes, 2014). He believes that a young child's self-constructing personality - neither movement nor speech development should be rushed, pushed, directed - merely creates favourable conditions for natural development in which movement, play, activity, curiosity interest in children can play a vital role. It is also possible to gain rich mathematical experience in this development. The visual and linguistic information related to the actions can have important mathematical elements and contents (Kissné, 2017). However, to help the development of young children consciously, most often it does not require complex tasks and abstract concepts. From birth, children are ready to learn, naturally curious and motivated to explore the world around them. It is up to the people around them and the stimulating environment to preserve this natural curiosity in the future. Among the child's various activities, it is almost impossible to find one without any direct or indirect mathematical experience. They are unobtrusively acquired by children through experience as they explore the outside world. Thus, for them, the process of learning about mathematics is an interesting and exciting discovery, which in case of success is a good inspiration for further experimentation.

Comprehensive questions:

- How could you justify the importance of early math skills?
- What was the main points of Tamás Varga's conception of baby maths?
- What are the key factors of the stimulating environment for young children?

3. From cognition to conceptualization at early years

3.1. Thinking and learning by doing

Due to the active lifestyle of the toddler in the stimulating environment, the cognitive processes, the observation and recognition reaches the level that by the end of the toddler's life he/she will be able to solve the problematic situations independently. The child develops

elements of learning that accompany him or her throughout his or her life. This is important from the point of view of mathematical education, because mathematical abilities are among the earliest manifesting abilities, and in order to develop they require all cognitive processes, perception – attention – memory – imagination – thinking. Therefore, mathematical education must pay attention to the development and improvement of these cognitive processes.

Developing such thinking in mathematics in early childhood is one of the most important goals of mathematics education at almost all ages. Mathematical knowledge would be self-contained and formal if not linked to by means of thinking. For this, however, the existence of a stimulating, inspirational and exploratory personal and material environment is indispensable. In addition, mapping early skills can be of paramount importance for the success of subsequent learning processes.

According to Stella Lourenco, a senior psychologist at the Children's Study Center at Emory University in Atlanta, United States, when you observe infants' spatial thinking and orientation, there is much to learn about their future/emerging mathematical abilities. The signs of spatial thinking appear at the age of six months, which is clearly related to later mathematical intelligence. It has been found that the ability of spatial reasoning is strongly related to later mathematical performance (Kissné Zsámboki – Farnady Landerl, 2018).

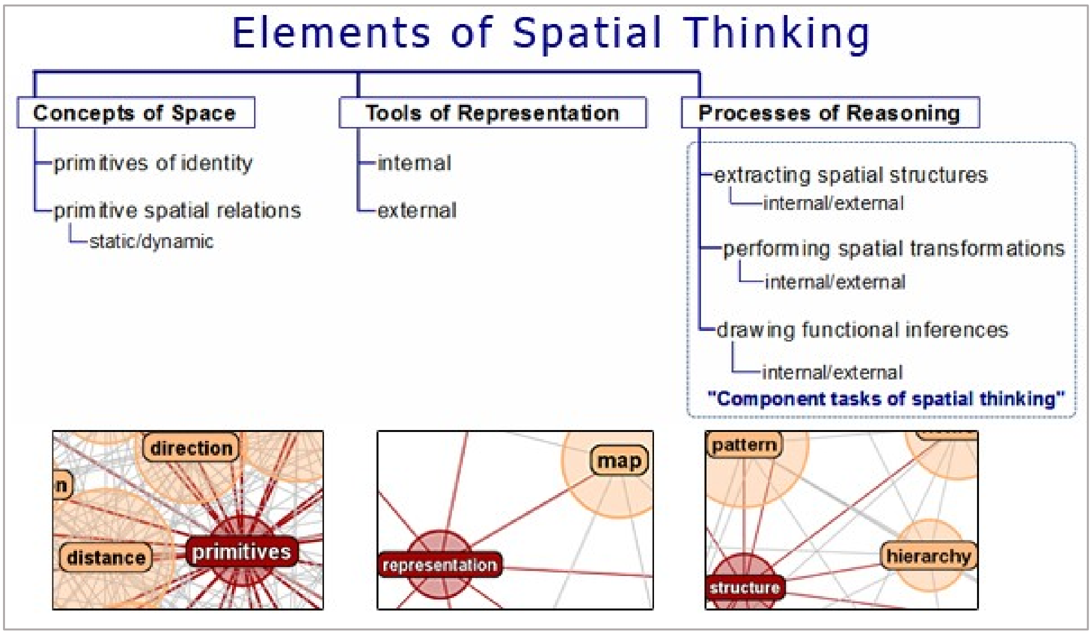


Figure 4. Elements of spatial thinking
(http://teachspatial.org/elements-of-spatial-thinking)

Experience is the result of perception, memory, imagination, without affecting thinking. The process of gaining experience begins with perception. Even a one-year-old child can recognize repeatedly observed things. Recognition is the first form of remembering. In more complex situations it is harder to recognize, and in experiential situations it is easier to remember. Our memories are not always realistic reproductions of perception, but certain qualities are more pronounced in them, and a typical image may be produced by generalization, which reflects reality more deeply than direct perception. When memory/recollection breaks away from reality, we are talking about imaginary imagery, evocation of imagination. This is also the way to gain mathematical experience (Cole & Cole, 2006).

The formation of the thinking structure begins with action. Thus, we can talk about thinking operations from an early age. The highest level of cognitive activity is thinking. It is necessary to solve problems that cannot be solved directly by perception, memory or

imagination. The problem is that there is a goal we want to achieve, but we do not know how to reach it. Through these cognitive functions, the toddler develops elements of learning that accompany him or her throughout his or her life. This is important for mathematical education because mathematical abilities are among the earliest manifestations and require all cognitive processes, perception - perception - attention - memory - imagination and thinking to develop. That is why mathematical education must pay attention to the development and development of these cognitive processes (Zsámboki, 2007).

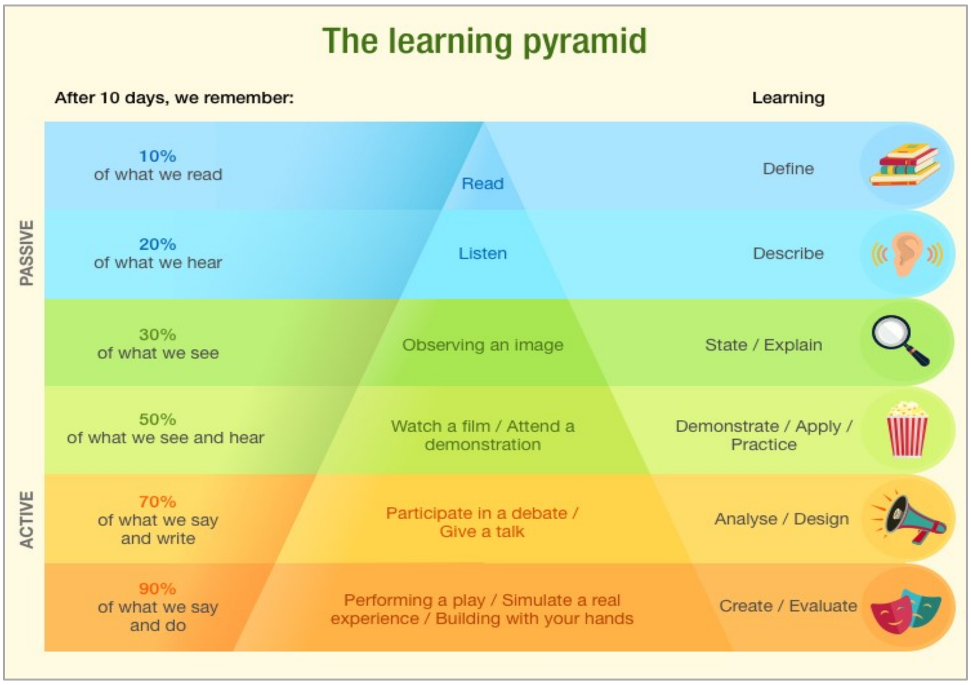


Figure 5. The learning pyramid
(https://www.iberdrola.com/talent/learning-by-doing)

3.2. Developmental stages of conceptualization

Reviewing the development of thinking and conceptualization processes as a result of gaining experience can also be important because, in addition to developing a harmonious personality, gaining experience, educational work can greatly contribute to the development of problem-solving thinking and concepts in children. (For the foundation of both mathematical and non-mathematical concepts.) The description of the developmental stages of conceptualization is related to the name of György Pólya, a world-famous Hungarian mathematician.



Figure 6. Pólya György,
Hungarian mathematician, the father of problem solving[12]
(https://peoplepill.com/people/george-polya)

At the beginning of the developmental stages, gaining experience, gathering facts and information while manipulating objects is of paramount importance. At this stage, it is important that the essential features of a given concept are repeated and the non-essential ones change. Children should be able to participate in many sensory-movement experiences and manipulation with objects and toys appropriate to their age. During the second stage, the experiences, the memories, "come together". Children now observe the typical features of the concept and are able to recognize shapes similar to the concept on the basis of their perceptions. In the third phase, during formalization, imagery becomes knowledge during thought operations (primarily abstraction and generalization). Knowledge is verbalised. Abandoned from all their other qualities, the shapes previously called similar now get the same generic name. This phase can be done later, at the end of kindergarten or early in school. In the final, assimilation phase of conceptualization, concepts are integrated into a coherent system that expands and possibly undergoes structural changes. The concept itself changes as the child becomes aware of his or her place in the given conceptual system and its relation to other systemic elements (Butterworth, 2005).

Comprehensive questions:

- What kind of visual indicators can be detected of spatial thinking appearing at the age of six months?
- How could you find correlation between the 'learning pyramid' model and the concept on learning math at early years?

[12] Pólya György (1887, Budapest – 1985, Palo Alto, California, United States). He was a professor of mathematics from 1914 to 1940 at ETH Zürich in Switzerland and from 1940 to 1953 at Stanford University. He remained Stanford Professor Emeritus for the rest of his life and career. He worked on a range of mathematical topics, including series, number theory, mathematical analysis, geometry, algebra, combinatorics, and probability. He was an Invited Speaker of the ICM in 1928 at Bologna, in 1936 at Oslo, and in 1950 at Cambridge, Massachusetts.

4. Numeracy and numerical innate abilities

According to a study by David C. Geary, a renowned American cognitive development and evolutionary psychologist, in 1995, we have at least: determining the morbidity of a small population (3-4 items), comparing sets without quantities, element counting ability and addition and subtraction up to 3 (Geary, 2001). Counting as a serial ability is thus inherited. One sign of this is that children count before the age of two, even if they are not in the right order. Around the age of three, the acceleration of arithmetic abilities is observed, because children already understand that the names of each number correspond to a certain number. On the other hand, they are capable of distinguishing part whole. Several studies have shown that children already have the concept of addition and subtraction before the age of five (Desoete et al., 2009).

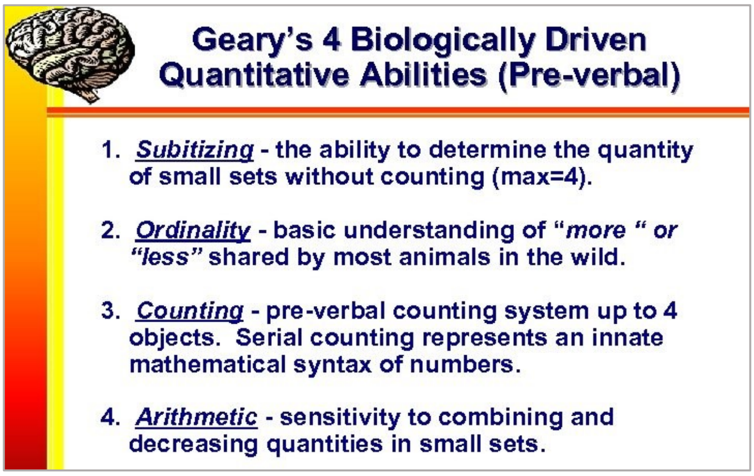


Figure 7. Innate numeric abilities

(https://present5.com/the-neuropsychology-of-mathematics-steven-g-feifer)

Former research points to early addition and subtraction being an innate ability.[13] Subitizing is one of our primary mathematical abilities. "Subitize", from the Latin word for "suddenly", is the ability to quickly identify the number of items in a small group.[14] Toddlers can differentiate between one and three items; by age of seven, this increases to between four and seven items. (Pellissier, 2015)

[13] In a 1992 study at the University of Arizona, for example, 6-month-old babies were shown one baby doll. As the babies watched, a screen was placed in front of the doll and then a second doll was placed behind the screen. When the screen was removed, scientists could tell that, at just 6 months old, babies expected to see two dolls. In instances when there were fewer or more dolls when the screen was removed, the babies stared longer because the results were wrong, a "violation of expectation".

[14] When Dustin Hoffman's character in Rainman looked down at the pile of spilled toothpicks and knew without counting that there were 246, that was an example of advanced subitization.

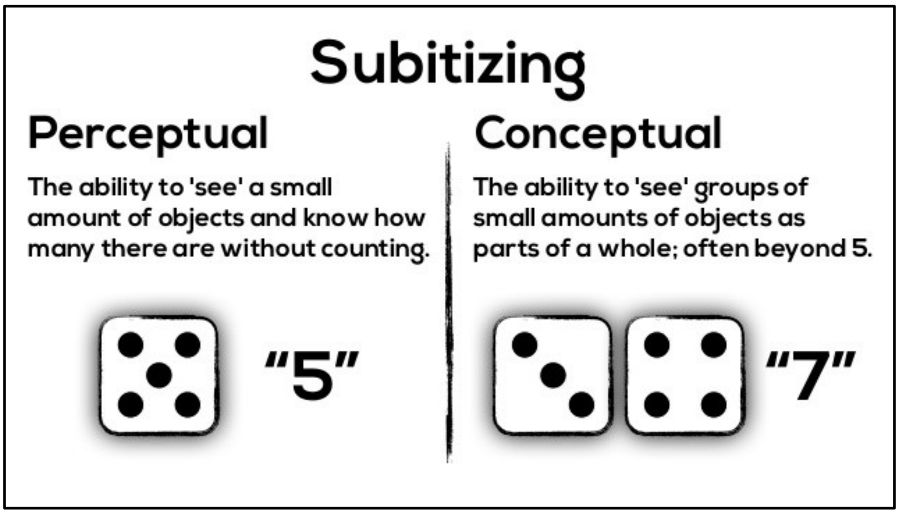


Figure 8. Types of subitizing
(https://images.app.goo.gl/ayTgM2WwttNiXzv36)

The development of the concept of the number in young children began in the 1980s by the habituation method. Prentice Starkey and Robert G. Cooper (1980) studied infants aged 4-7 months. The babies sat on their mother's lap and watched a screen. The researchers looked at how long babies looked at projected images showing two black dots at different distances. After the children lost interest in the two-dot images, three dots suddenly appeared on the screen. This image was viewed by infants for significantly longer periods than the previous two dots. Thus, the three-point image was perceived as being different from the two-point image, which in turn was perceived as similar by infants (Feigenson, L. – Carey, S. – Spelke, E., 2002)

The validity of the results of the above experiments was questioned by other researchers in the late 1990. They claimed that it is almost impossible to design stimuli where only the number of elements is different in the two figures. Certain perceptual variables always change with cardinality. For example, when the number of elements changes, the total circumference of the elements, the area they fill, or the amount of light they reflect also changes. If researchers are interested in the number discrimination abilities of babies, they need to be sure that infants are responding to the cardinality rather than the perceptual variables that correlate with it (Clearfield-Mix, 1999). Most of the studies conducted after 1999 have attempted to control the effects of perceptual variables in many ways and have produced much more reliable results.

Comprehensive questions:

- What are the four innate numeric abilities by D. C., Geary?
- Could you mention three situations when children use subitizing ability in their activities?

5. Mathematical competences in early childhood

Competence is defined by the ability to apply effectively in a variety of situations. It is based on knowledge, skills, experience, values and attitudes. But can we talk about the foundation and development of mathematical competence in early childhood? The basic purpose of mathematical education at all ages is to enrich and shape a child's personality and thinking. In

accordance with the age-specific characteristics, playful activities, adherence to the principle of graduality, and the application of experience-based methods of cognition can bring mathematics, as a discipline, to the world of children who live in unity and wholeness. Mathematics can be discovered in the natural and social environment surrounding the child. With the help of appropriate methods, in the kindergarten they can begin to develop the ability to independently acquire knowledge, to develop problem-solving skills, creative thinking, to prepare, to base the number and operation concept, and to calculate skills. The complex view that mathematics is not only a stand-alone science but also a contributor to other sciences, part of our daily lives, part of humanity's cultural heritage, way of thinking, creative activity, the source of the joy of thinking and the representation of order and aesthetics in structures can be effectively grounded in samples. Thus, in the light of the above thoughts, we can safely answer yes to the question whether we can talk about the foundation and development of mathematical competences in kindergarten.

The three components of mathematical competence are mathematical knowledge, mathematical-specific skills, and abilities, and mathematical motivations and attitudes. Obviously, the importance of these three components is different in mathematical education. The acquisition and teaching of abstract mathematical knowledge and scientific concepts can no longer be the goal of early childhood education. Though it cannot be doubted that such activities are also present in children's activities, mostly indirectly. (e.g., knowledge of the circle, concept of the circle during the round games). The most important ability and skill components of mathematical competence are summarized in the following table.

Table 1. The most important skills and competence components of mathematical competence (Source: Fábián et al., 2008)

Skills	Thinking skills	Communication skills	Knowledge acquisition abilities	Learning abilities
• counting • calculation • quantitative inference • estimation • measurement • units of measurement • text task solution	• organizing • combinativity • deductive inference • Inductive inference • probability inference • reasoning • Proving	• relation vocabulary • comprehension • text interpretation • spatial vision, spatial relations • representation • presentation	• problem sensitivity (questions) • problem representation • originality, creativity • problem solving • metacognition	• attention • partial-whole perception • memory • task management • problem solving speed

One of the most important skills in mathematical competence is the ability to think, but it can be realized at the same time through a variety of abilities (e.g., systematization, combinativity, deductive and inductive inference, reasoning). Thus, the ability to think that was developed in kindergarten activities, should become applicable in many other areas of life.

Organizational ability means collecting and systematizing the information and data appearing in the task and the problem raised, and, the ability to integrate the newly acquired knowledge into the system of previous knowledge. The meaning of age-appropriate language development, comprehension, text interpretation, and relational vocabulary does not need to be interpreted, but it must be emphasized that its existence is indispensable for the recognition and understanding of mathematical texts. It is important whether the child has already acquired a

knowledge at a skill level and, for example, can he / she solve a problem with on this knowledge in the head, and the amount of memory will play a role. A note of an action (formula) (during applications) indicates the child's associative memory. Intelligent memory can help you learn by understanding the relationships between things to remember. The most important component of early childhood education is the third component, that is, the formation of mathematical-related motives and attitudes, the maintenance of curiosity about mathematical content and experiences hidden in the outside world, the nurturing of interest and inner motivation by games are required (Skemp, 2005).
Mathematical education plays an important role in practicing thought activities, increasing the flexibility of thinking, developing constructive ability and creativity. According to Zoltán Dienes, an internationally renowned Hungarian mathematical professor (2014), children forget most of the mathematics they have learned, so we cannot simply aim at acquiring knowledge. The natural process of maturation and development should not be hastened but enriched. By the age of three, the combined sensory-motor ability of a healthy infant's perception and movement makes him able to handle his or her environment, discover himself or herself in his living space, discover and experience human, natural and material environment.

6. From lecture method to discovery approach

Teaching is much more than transmitting knowledge, facts, information or data. For it is said that: *"A poor teacher tells; An average teacher informs; A good teacher teaches; An excellent teacher inspires"*[15] The new instructional pedagogy requires teachers to move away from lecturing and move towards activity based learning. Most teachers often teach Maths by the "lecture method" even at early years. While teachers becomes very "active", children are rather "passive". This does not lead to a lasting learning. Active learning involves those strategies where children act, touch, feel, participate, discover facts and ideas in the learning process (Azuka, 2013).

Through activity and interest, children will gain experiences of formal, quantitative and spatial relationships of the narrower and broader nature-human-material environment. In the course of discovering reality, they develop a positive emotional relationship with nature and human creations, and they learn to protect them and to preserve values. While discovering the environment, children acquire experience and knowledge of mathematical content and use them in their activities. Teachers should provide opportunity, time, place and tools to gain spontaneous and organized experience and knowledge. They should promote children's independent opinions, the development of decision-making abilities.

Discovery approach of teaching is a method where children are guided by the teacher to discover mathematical facts and formulae through observations and organized activities. In this approach the teacher provides the materials and guides children to carry out some activities which would lead them to arrive at a new knowledge. Discovery activities could be done individually or in groups of few children. This approach enables children to actively participate in the learning process and discover things for themselves.

[15] URL: https://issuu.com/alexanderdecker/docs/activity_-based_learning_strategies [2021.06.16.]

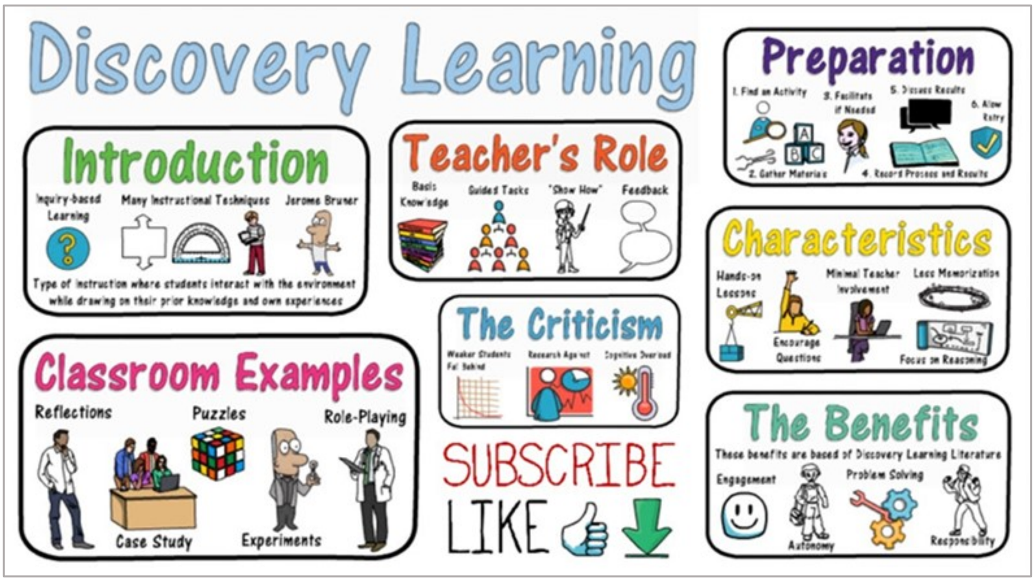


Figure 9. Discovery approach of learning
(https://youtu.be/i6j1YxxbogM)

For most children play and work-like activities provide the most effective learning by which understanding of mathematics and sciences can develop. When a subject is presented as a mass of sheer facts, children are not able to form patterns and establish meaningful relations among the stimuli, or connect them with their own past experiences. The result is a distorted concept formation and a distressing tendency to avoid the subject later in life (Elliot, Thomas & Joan, 2000). This idea is also underlined by the ancient proverb that states: *"what I hear I forget; what I see I remember; what I do I understand"*. This means that until a child practicalises a concept or participates in the learning process, he cannot understand the concept. To evaluate teaching is to evaluate the extent children have been inspired to think and create ideas. This can only be achieved through practical activities which make children to be active in the teaching-learning process.

The following basic mathematical dimensions can be introduced at an early age to enhance a child's understanding of Math through practical activities:

1. *Math Language* – terms such as "more than", "greater than", "less than", "equal to" and so on.
2. *Number Sense* – This is the aspect of Math that outlines facts such as the number 2 represents two objects and that 3 is greater than 2, but less than 5, etc.
3. *Measurements* – various types of measurements (e.g. amounts, sizes, and even distances) that must be taught in Math fundamentals for children.
4. *Geometrics* – Children should learn various shapes, patterns, and individual characteristics and features of objects.
5. *Spatial Relationships* – Children learn about objects that are in front, in back, and to the side. Also, this covers the distance concepts of 'near' and 'far'.
6. *Exploring shapes* − Everything in our world has a unique shape. Examples of shapes (e.g. circle, square, triangle, oval, rectangle, and diamonds) should be taught in basic Math for children.
7. *Sorting* − Sorting by the color, by the shape, by the unique texture associated with the objects, the size, and even the category could be taught at early age. This helps children learn how to sort similar items so that tasks such as counting and dividing become much easier.

8. *Patterning* − taking an item, such as blocks, crayons, and math manipulative and grouping them in such a way that one design is consistent. Patterns can be taught through the integration of music and math games.
9. *Counting* – Encourage children to count objects in their world, such as toys, buttons, blocks, windows, doors, cars, and other items. It does not only enhance their overall knowledge of the number system and mathematics, but also optimize their awareness of things existing around them.[16]

Children are able to understand symbols and abstract concepts only after experiencing the ideas on a concrete level. They need to have Math experiences that incorporate their senses, that require them to experiment and make observations, and that allow them time to investigate a topic further. Children learn Math with concrete materials, thus they need concrete objects like real stuff, manipulatives, materials, such as blocks, counters, popsicle sticks, in order to make sense of new math concepts or abstract ideas. After children had several opportunities to learn a new concept with real objects they are ready to connect their learning to abstract symbols such as numbers and math symbols. However they need plenty of time to play with math materials before they use them for teacher guided Math activities. It is also important linking Math to the everyday experiences. Math games and activities are also very good opportunities to build Math vocabulary, but the general principle is *"things before ideas and ideas before words"* (Azuka, 2013).

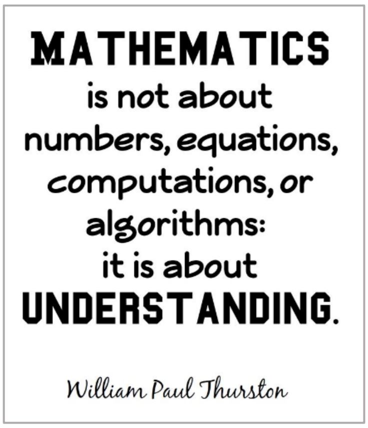
Comprehensive questions:

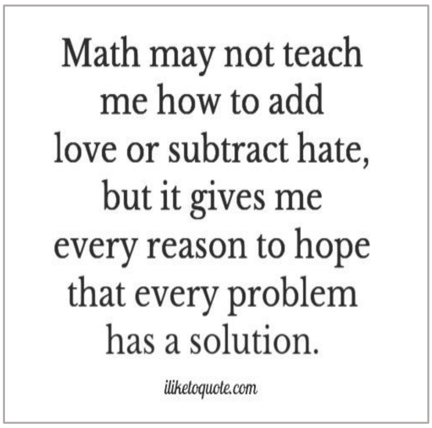
- How would you introduce basic mathematical dimensions (p. 71) by play or by practical activities?
- How could you interpret Azuka's concept into your teaching practice? *"Things before ideas and ideas before words"*

7. Conclusion

Children mathematical knowledge at the early years predicts later academic achievement better than early reading or attention skills. Math is not only measuring, sorting, noticing patterns, making comparisons, counting, but also thinking in structures and solving problems. Therefore we can use many ways to incorporate math learning into the daily practice of teaching. Teachers can foster a positive attitude toward math. They can find ways to incorporate enjoyable math activities and math talk into regular activities like cooking, setting the table, and going for a neighbourhood walk. Discovery approach of teaching strengthens problem solving and using mistakes as an opportunity to promote growth mindset. When children focus on problem solving rather than on getting the right answer they learn more. "*Discovery learning is the method that takes place when a teacher sets up an experiment, acts as a coach, and provide clues along the way to help students come to solutions."* (Krisnawati cited Hedge, 2003)

[16] URL: https://kiwipreschool.com/santa-rosa/child-care/teaching-basic-math [2021. 02. 16.]





REFERENCES

Azuka, B. F. (2013). Activity -Based Learning Strategies in the Mathematics Classrooms. *Journal of Education and Practice* 4, No.13. pp. 8−15.

Bijeljac-Babic, R. – Bertoncini, J. – Mehler, J. (1993). How Do 4-Day-Old Infants Categorize Multisyllabic Utterances? *Developmental Psychology*, 29 (4), pp. 711−721.
DOI: https://doi.org/10.1037/0012-1649.29.4.711

Butterworth, B (2005). The development of arithmetical abilities, *Journal of Child Psychology and Psychiatry*, 46 (1), pp. 3−18.
DOI: https://doi.org/10.1111/j.1469-7610.2004.00374.x

Clearfield, M. W. – Mix, K. S. (1999). Number Versus Contour Length in Infants' Discrimination of Small Visual Sets. *Psychological Science* 10(5) pp. 408−411
DOI: https://doi.org/10.1111/1467-9280.00177

Cole, M. – Cole, R. S. (2006). *Fejlődéslélektan.* Osiris Kiadó, Budapest.

Dean, D. Jr. − Kuhn, D. (2006). Direct instruction vs. discovery: The long view. *Science Education*. 91 (3) pp. 384–397.
DOI: https://doi.org/10.1002/sce.20194

Dehaene, S. (2003). *A számérzék. Miként alkotja meg az elme a matematikát?* Osiris Kiadó, Budapest.

Desoete, A. – Ceulemans, A. – Roeyers, H. – Huylebroeck, A. (2009). Subitizing or counting as possible srceening variables for learning disabilities in mathematics education or learning? *Educational Research Review* 4 pp. 55–66.
DOI: https://doi.org/10.1016/j.edurev.2008.11.003

Dienes Z. P. (2014). *Játék az életem : Egy matematikus mágus visszaemlékezései*. EDGE 2000 KFT, Budapest.

Elliot, S. − Thomas, A. − Joan L. (2002). *Educational psychology; effective teaching, and effective learning.* (Third Edition). MC Graw Hill Companies Inc. India.

Fábián M. − Lajos J. − Olasz T. − Vidákovich, T. (2008). *Matematikai kompetenciaterület szakmai koncepció.*
URL: https://bit.ly/2vpZq7R [2019.08.08.]

Feigenson, L. – Carey, S. – Spelke, E. (2002). Infants' Discrimination of Number vs. Continuous Extent. *Cognitive Psychology* 44, pp. 33–66.
DOI: https://doi.org/10.1006/cogp.2001.0760

Geary, D. C. (2001). Principles of evolutionary educational psychology. *Learning and Individual Differences*. 12 (2002) pp. 317–345.
URL: https://web.missouri.edu/~gearyd/GearyEvoEd.pdf [2022.03.22.]
DOI: https://doi.org/10.1016/S1041-6080(02)00046-8

Hedge, T. (2003). Teaching and Learning in the Language Classroom. New York: Oxford University Press.

Keysers, C. − Gazzola, V. (2014). *Hebbian learning and predictive mirror neurons for actions, sensations and emotions*
URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4006178 [2018.06.27.]

Kissné Zsámboki, R. (2017). *Mindenben matematika.* RAABE Klett Oktatási Tanácsadó és Kiadó Kft., Budapest.

Kissné Zsámboki, R. − Farnady-Landerl, V. (2018). Neuropedagógiai innovációs lehetőségek a neveléstudományi kutatásokban az EMOTIV EPOC+ mobil EEG készülék alkalmazásával. *Képzés és Gyakorlat* 16 (3) pp. 21−36.
URL: http://publicatio.uni-sopron.hu/1733 [2022.03.22.]
DOI: https://doi.org/10.17165/TP.2018.3.3

Kitzinger, A. (2009). Children in our Multilingual-Multicultural Europe. In Tengerdi, A., Varga, L. (Eds.), *A gyermekkor narratívái,* pp. 17−29.. Sopron: Edutech

Klingberg, T. (2012). *The Learning Brain: Memory and Brain Development in Children*. Oxford University Press, Oxford.

Márkus, A. (2007). *Számok, számolás, számolászavarok*. Pro Die Kiadó, Budapest.

Pellissier, H. (2015). *Why early math is just as important as early reading?*
URL: https://bit.ly/36CBEbA [2021.02.01.]

Pléh, Cs. (2010). *A lélektan története*. Osiris Kiadó, Budapest.

Varga, L. (2015). Early Years Last Forever. In: Florida, Gulf Coast University The College of Education (Ed.), *Scholarly Forum 2015,* (pp. 1-1). USA: Florida Gulf Coast University.